Electrical Review

Vol. 76—No. 17. CHICAGO, SATURDAY, APRIL 24, 1920. Page 675.

Lighting of the Living Room

Predominating Use of Dining Room Makes Its Lighting Important —Methods of Lighting and Styles of Fixtures — Use of Colored Light — Fourth of a Series of Articles on Residential Lighting

By M. LUCKIESH

Nela Research Laboratory, Cleveland, Ohio.

The arrangement of furniture in a dining room is very definite and the setting in this respect is rarely changed. Accordingly, technical problems involved in the lighting may be solved in a straightforward manner.

A variety of occasions is found in the living room, but the dining room is predominantly used for the purpose indicated by its name. However, an elaborate dinner is an occasion for the utilization of light for its effectiveness, and there are excellent reasons for equipping the dining room with wiring and lighting accessories adequate for these special purposes.

The psychology of light is capable of analysis and if one studies and experiments with lighting in the dining room he reaches the conclusion that the table should be the most intensely illuminated area in the room. Matters of taste cannot be subjected to simple unvarying rules, but usually beneath them are to be found certain underlying principles.

When a party gathers around a dining table

Fig. 1.—"Semi-Indirect" Fixtures May Supply the Moderate Intensity of General Lighting and Candlesticks the Direct Light for the Table in a Dining Room.

the members should be interested in each other and in what the table affords. A brightly illuminated table holds the attention of the diners and a low intensity in the outskirts of the room hems them in. That the table should be the brightest area in the room is easily demonstrated by experiment. In fact, this experiment is one of the interesting features of the demonstration room described in the second article of this series.

If a dining table should be the dominantly lighted area in the room, why are so many dining rooms lighted otherwise? The answer is the same as in many other aspects of residential lighting, namely, that the householder has not

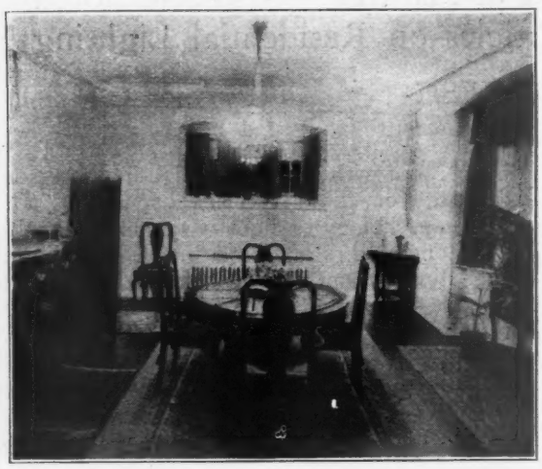


Fig. 2.—Candelabra Should Be Equipped With Shades Possessing White Linings, But Even Then the Light Is Too Predominantly Upward.

been shown the possibilities of lighting effects. Comparisons are the most effective means of determining appropriate lighting effects, and these can only be made in a room fitted for the purpose of demonstration.

Methods of Lighting the Dining Room.

In discussing the lighting of the dining room it appears best to analyze the various methods which have been employed, pointing out their defects and desirable features. It is noteworthy that the decorator often employs wall brackets in elaborate dining rooms. They may be artistic objects, but, despite their beauty, they are inappropriate for providing the important lighting of a dining table. In fact, from the standpoint of lighting, they have little reason to exist at all in such a room. Even though the table is lighted by local lamps of the form of candlesticks, the lighted brackets are distracting and usually glaring. The attention of the diners is sure to wander to them and that feeling of unity so essential to a harmonious effect is lacking. There is a strife between the center of interest and these "side shows." Little may be said in favor of wall brackets in a dining room even as secondary fixtures, and there is much for which to condemn their use.

Well-shaded candlesticks containing small lamps may be attractive on the table and they may be very effective. They must be short in order that the view of the diners is not obstructed. Too often they are a source of glare. Their best office is to supplement a low intensity of general lighting from fixtures which alone do not provide a satisfactory effect. If their disadvantages are overcome they add a charm to the setting, but the unsightly annoying wire which often dangles from the central fixture usually detracts from their satisfactoriness. Candlesticks on the buffet provide a delightful touch, but too often these are so bright that they overbalance the primary lighting effect. Miniature lamps are satisfactory for this purpose. The low voltage may be obtained from a small transformer, or a satisfactory expedient is to connect two lamps of ordinary voltage in series. A further refinement in this case is a series-parallel switch, for there still may be occasions at the buffet when the higher intensity afforded by a parallel connection is desirable.

Inverted Bowls.

The inverted bowl may be criticized for lighting the upper part of the room predominantly. It may be used to provide a low intensity of general lighting of different tints if the dining table is supplied with small lamps (Fig. 1). In fact, the latter is a common solution for householders who come to realize that dining under the general lighting from inverted bowls is quite unsatisfactory.

There are thousands of semi-indirect bowls in use in dining rooms, but they were sold as objects and not for the lighting effects which they produce. Semi-indirect and indirect fixtures have contributed much to the development of lighting and they have shielded the eyes from the constantly increasing brightness of modern light sources, but they are out of place in the dining room except for providing secondary general lighting of a low intensity.

Candelabra Units.

The so-called candelabra (Fig. 2) suspended from the ceiling has been widely installed in dining rooms during recent years. When these are not equipped with shades the dominant light is distributed upon the ceiling. The frosted lamps hanging high also contribute to the effect of a dusky haze at the table and a brilliant ceiling above.

The lighting effect is not much different from that of the inverted bowl and is far from satisfactory. If the lamps are equipped with suitable shades (it is easiest to use silk) much of the light may be directed downward, provided the shades have white linings. Although the use of shades improves the candelabra it is not wholly satisfactory, for the diner on looking up sees these lamps or bright inner linings. In fact, the consciousness of their presence is distracting. This and many other experiments indicate that dining-room fixtures should not be hung high unless they are very specially designed to confine the downward component to the table.

Shower Fixtures.

The shower consisting of a group of pendant shades is one of the most satisfactory fixtures for lighting the dining table among those which have been widely installed, provided that the shades are of proper shape and that they are hung low enough. Generally they should not be

more than 3 ft. above the table. Their lower aperture should be small and they should be deep and of dense glass. Usually bowl-frosted lamps are more satisfactory than clear ones. The downward light from these shades is much more powerful than the diffused light and therefore the table is dominantly illuminated. If the shades are of a warm tint the effect may be quite delightful. However, a shower which is quite satisfactory when hung low is usually very unsatisfactory when too high. The aim in lighting the dining table should be to keep the distribution of direct light confined considerably below a point about 12 or 14 ins. vertically above the edge of the table. In Fig. 3 is shown a well-installed shower which might be more satisfactory if the apertures of the shades were smaller.

The old type of dome, if properly designed and hung, provided a much better effect than fixtures which superseded it. Its chief faults were its obtrusiveness and its wide aperture, which made it necessary to suspend it very low. If it were raised higher the lamps became visible and glare was the result. But instead of correcting these defects or of including its desirable effect in new fixtures, the lighting principle of the dome was abandoned when more modern fixtures were adopted.

Fixture manufacturers have not realized that fixtures as objects may go out of style, but fundamental lighting principles do not. This is an axiom which should be memorized by the fixture designer. When the proper lighting effects are determined for a definite setting like the dining table these should be retained and improved upon in new fixtures instead of being

Fig. 3.—A Shower Hung Low and Equipped With Dense Shades of Small Aperture May Provide Excellent Lighting for the Table.

sacrificed. However, this is one of the penalties which lighting has had to pay for the lack of appreciation of the primary importance of lighting effects and the secondary importance of lighting fixtures as objects.

Recently modern domes have again come into use, but they are improvements over those more obtrusive ones of earlier years. They are smaller, and with the greater luminous intensity of modern lamps it has become possible to place the

Fig. 4.—The Modern Dome Is an Improvement Over the Older Types, But Its Large Aperture Still Necessitates Hanging It Low.

light source high in the dome and thus to shield the eyes from it. But this dome must be hung rather low to be satisfactory. (See Fig. 4.) In Fig. 5 is shown another fixture which would be more satisfactory if hung within 30 ins. of the table. A deeper textile shade would also improve it.

Inverted Bowl with Downward Component for Lighting Table.

With the intention of incorporating the desirable feature of the dome into a fixture of modern appearance which could be hung high, the fixture shown in Fig. 2 of the second article of this series (page 519, March 27 issue of Electrical Review) was developed. It has been described elsewhere* but will be briefly discussed, for it is representative of the production of a fixture with an aim. It appears like an inverted glass bowl, but there is a small aperture 4 ins. in diameter in the center of the bottom. Above this is a reflector and a frosted Mazda C lamp which is placed in such a position that the cone of light emerging from this aperture nicely covers the table. This may be obtained from a Mazda daylight lamp and if so the effect upon the table is very satisfactory. The inner reflector should be translucent and tinted a warm tone, so that the light diffused through it to the outer bowl is of a warm tint. The larger bowl of dense glass is at a low brightness. Another circuit provides current to small lamps in the larger bowl for a semi-indirect component.

The above is a description of the unit in its simplest form, but it has been built with as many as five circuits. Such a unit may be suspended 3 ft. above the table without any effect of glare from the small aperture because of the accuracy with which the downward component is controlled. Furthermore, this control is obtained in an extremely simple manner, namely, by the relation of the height of the light source above the aperture to the diameter of the aperture.

Interesting effects of colored light may be ob-

*"The Lighting Art," by M. Luckiesh, p. 141; McGraw-Hill Book Co., New York.

tained by means of lamps concealed in a cove or in wall boxes. If two circuits, as referred to in the second article of this series, are installed in a cove and provided with blue and yellow-orange lamps, respectively, cold and warm-tinted light may be added as secondary effects to the primary lighting. By combining the two tints a rose tint is obtained. These have been installed with considerable success. They are secondary effects inasmuch as their intensities are much lower than necessary for adequately lighting the room. They are the beginnings of an era in which color effects are to be obtained in lighting as well as in decoration, dress, etc. They represent some of the possibilities of the mobility of lighting.

Fig. 5.—This Unit, Which Gives a Predominant Upward Component, Would Give a Much Better Effect If Hung About 30 Ins. Above the Table.

One or two baseboard outlets are desired in the dining room besides that for connecting candlesticks on the buffet. Sometimes it is convenient to attach electric devices to the baseboard outlet, but a connection may be provided on the central fixture for this purpose. The candlesticks for the table may also be connected at this point.

In general, this discussion has been based upon the assumption that the dining table should be more highly illuminated than any other area in the room. That this is true may be readily determined by adequate experiments.

The first article of this series appeared in the issue of March 13, and gave an analysis of various aspects of residential lighting. The next article, which appeared March 27, dealt with lighting effects versus lighting fixtures. The third article, which appeared April 10, gave a summary of the principles of illumination as applied to living rooms, and the next article will give consideration to the lighting of rooms other than the living and dining rooms of the typical middle-class home.

LONDON RAILROAD ELECTRIFICATION PLANNED.

It has been announced that the Great Eastern Railway Co., London, England, has commenced preparations for the electrification of its suburban zone. This zone lends itself more readily to electrification than that existing in any other suburban area, owing to its density of traffic, the number of diverging routes centering in one terminal, and an immediate and pressing demand for increased passenger facilities. Immediate economies coupled with a stimulus to traffic are anticipated. Several years ago preliminary steps were taken by this railway for electrifying the London lines from Liverpool street station outwards. Attention was given to the running of a tube several miles out from stations placed beneath the large area covered by Liverpool street terminus. Estimates on the project have been put at $50,000,000, but while the details are unsettled and costs of materials and labor are unstable, no actual outlay figure can be given.

JAPANESE MANUFACTURE OF ELECTRICAL PORCELAIN.

One of the newer developments in the pottery industry is the manufacture of electrical accessories in connection with the rapidly expanding electrical industry in Japan. The large high-tension insulators demanded by hydroelectric development are made both in large factories such as the great Morimura plant at Nagoya and also by small individual workshops (on subcontracts) in villages.

The large pole insulators are thrown on an ordinary wheel which usually is motor-driven. When shaped they are passed to a second man who turns them to size with a tool. Finally they are carefully finished by hand before drying. They are glazed in the clay and fired once. One man carrying through all the processes will throw, turn and finish 400 insulators in a day, for which he gets about 1.70 yen (including a rice stipend).

Smaller white porcelain goods, insulators, cleats, rosettes, etc., are for the most part manufactured in Japan in the households alongside of dolls and teapots. They are molded in plaster of Paris molds, with a lavish expenditure of time and energy, from clay purchased ready for working, and are then fired in community kilns. With practically no overhead charges, such small manufacturers are able to compete successfully with modern factories. In fact, one large establishment which put in an insulator factory has been undercut in price by the small independent potters to such an extent that it has almost ceased to do business.

OWN YOUR OWN HOME ELECTRICAL COMMITTEE MEETS.

A meeting of the Electrical Industries Committee of the Own Your Own Home Exposition was held in the rooms of the Society for Electrical Development, New York City, April 20, at which time the plans and specifications for the electrification including wiring and installation of appliances of the model bungalow to be constructed on the floor of the exposition were discussed. Other work of the committee includes making arrangements for electrical exhibits in other parts of the exposition. Because of the importance of electrical development in the home and the influence that exhibits will exert on prospective home owners it is desirable that all electrical exhibits be properly installed.

Electric Fan Proves Its Universal Usefulness

Preparations for Coming Fan Season on Larger Scale Than Ever — Research Develops More Efficient Employment of Fans in Old and New Fields—Makers Help Dealers in Big Campaigns

With the approach of summer, electrical dealers are preparing to participate in fan campaigns which have been mapped out by the industry on a larger scale than ever. Since the public has been prepared, through the efforts of the past two or three seasons, for greater appreciation of the utility and economy of the electric fan as an all-year-around necessity rather than a seasonal luxury, the result should show an unusually profitable season in this commodity.

Most of the dealers have received, or are now receiving, generous supplies of helpful printed matter for use in furthering the education of the public to the many new advantages in the use of the electric fan, and its more scientific and economical employment along the old lines. Not only booklets and pamphlets but some effective form letters with which to catch the various classes of trade are being supplied by the manufacturers for the use of dealers. In addition of these helps there will be special campaigns of national magazine and newspaper advertising by manufacturers, who are also furnishing especially attractive designs and material for window displays. The national advertising campaigns are scheduled to start in June and continue during the summer.

While the market was pretty well cleared of fans last summer during the extreme hot spells, and the stock this year is practically all newly made, there are few if any changes in designs from those of last season beyond some refinements and better material and workmanship not so much discernible to the eye, such as durability of the motor and general efficiency of the fan.

Types of Fans.

Among the types of fans in most popular demand are the oscillating, non-oscillating, desk, bracket and wall fans, ceiling fans, gyrating fans for hanger or column, table fans, socket fans and ventilating fans.

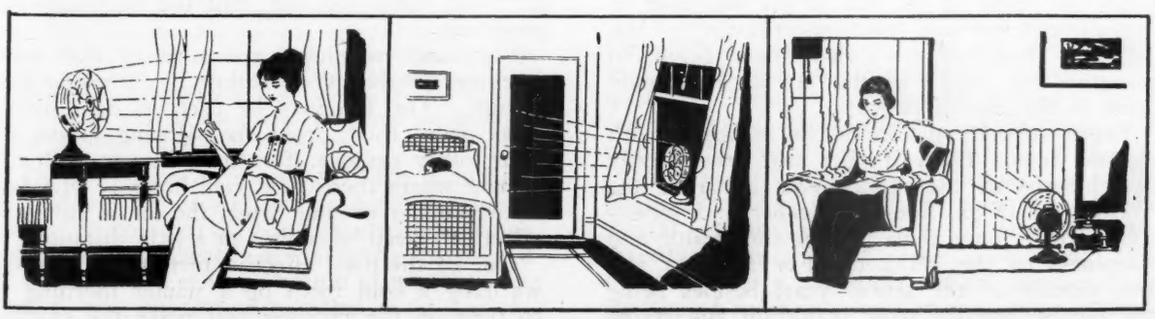
Oscillators are equipped with swivel and trunnion adjustments for raising and lowering the fan. The portable fans are made in 4, 6, 8, 9, 12 and 16-in. sizes, the most popular types in demand being 8, 12 and 16 ins. The 4-in. sizes are in demand only for very close quarters, for travelers or for suspension from sockets. The gyrating types are made in 8, 12 and 16 ins., while the ceiling fans are made usually in 52 and 56-in. sizes. The 9-in. size has lately found much favor in homes and offices where it is considered a happy medium between the 8 and 12-in. sizes. While all types of fans are made for either direct or alternating current as desired, many are now equipped with universal motors. The fans are designed with from two to five speeds, the 3-speed fan having the preference.

Among the novelties in fans is one specially designed for the use of travelers. It is small and light—weighs 2.5 lbs.—with 4.5-in. blades. This fan may also be used in small, confined places in the home. Another is a table fan designed with vertical blades that send a gentle breeze horizontally over every part of the table. An excellent table fan is made with an ordinary non-oscillating fan set with the face up, but with a deflecting plate directly above it to distribute the air laterally. The deflecting plate serves to support a dish of fruit, cake, a fern or flowers.

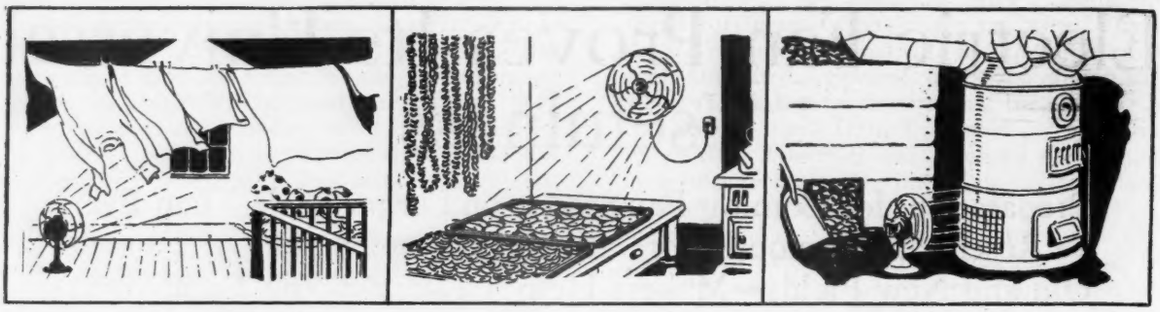
All-Season Utility of Electric Fans.

Dealers generally have ceased to regard the electric fan as a strictly seasonable article from a merchandising point of view. The success of fan sales, however, depends upon the stimulation of the hot season, when attention of the public is concentrated upon the fan as a ready medium of relief. Dealers this year are in a position to take greater advantage of the hot-weather fan psychology in the promotion of all-season utility than ever before.

Electric fans are now successfully employed



Cooling by Direct Breeze. Drawing Air Into Bedroom. Increasing Heat Radiation.



Drying Clothes Indoors. Fruit and Vegetable Drying. Increased Furnace Efficiency.

for a variety of uses in residences, offices, hotels, restaurants, hospitals, stores, shops, factories, schools, theaters, garages, barber shops, shoe-shining stands and other places. The most common uses to which the fans may be put are for cooling, ventilation, heating, drying, humidifying and for window displays. In each and all of these services the electric fan has proved its utility and economy.

As a part of the program this year for the promotion of larger fan sales the general public —through the agency of the manufacturers by campaigns of national advertising, and with booklets, pamphlets, circulars and letters for distribution by dealers—will receive much instructive information regarding more efficient use of the electric fan. While the public is learning to appreciate its many forms of usefulness, new applications are constantly being developed and the merchandising possibilities of the fan are constantly assuming a wider range.

More Efficient Cooling.

Working efficiency in offices and factories, especially where women and girls are employed, demands more general and extensive use of fans rather than confining their use to the days of extreme heat. While the full speed of the fan is required during the hottest spells, a more gentle breeze from the fan on mildly warm days has been found to greatly increase the efficiency of employes and cause them to be more satisfied and loyal. There is much yet to be taught the customer in the intelligent use of the fan for cooling purposes.

Only a small proportion of resident current consumers are as yet utilizing the electric fan even for cooling purposes. Those who have a practical appreciation of its value as a cooling agent know how to use the fan in the living room during the day, in the dining room at meal times and in the bedroom during the night. When there is illness during a hot spell they know the value of the fan in the sickroom to promote comfort and hasten the recovery of the patient. Hospitals everywhere have begun to recognize the utility of the fan as a valuable agent in the care of patients.

Every schoolroom should be equipped with electric fans. Even if they are needed only two months of the school year north of the Mason and Dixon line—September and June—they would more than pay in the health and happiness of the children. For the first and last months of the school year, besides being the hottest, are the most important and trying in the life of the pupil. If the combined efforts of manufacturers, dealers and interested humanitarians are successful next year will see every school that is wired for electricity equipped with fans.

Ventilation by Electric Fans.

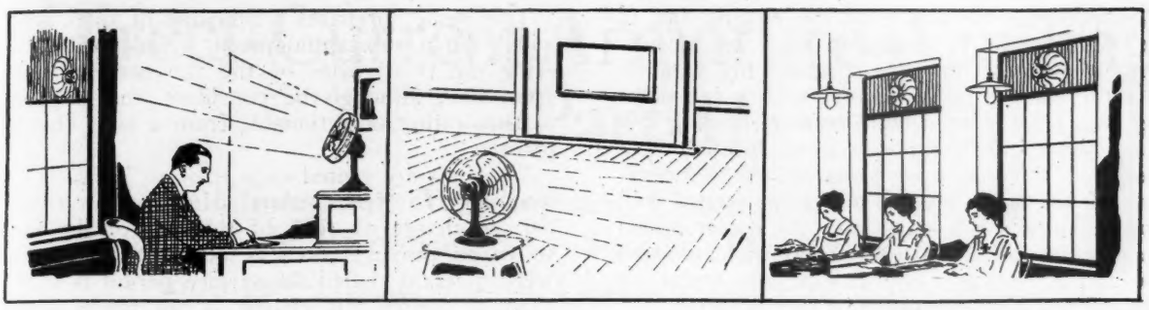
Improvement of the air in rooms and other inclosures to make it more wholesome can be easily and economically accomplished with electric fans. Sickrooms, kitchens, sleeping rooms, living rooms, basements, cellars, attics, warehouses, offices, workrooms and other places where air frequently becomes stagnant and impure may be kept fresh and sweet by the proper establishment of air currents with the aid of fans in winter as well as summer. This is particularly beneficial in winter when all openings are usually kept closed to exclude the cold.

One important feature of proper ventilation is to keep the air in motion. This should be combined with the renewal of the air at stated intervals and in such a manner that an even and comfortable temperature will be maintained. In this manner the fan may be used to obtain ventilation in the largest sense of the term. Without circulation the air is likely to become stale in the breathing zone and produce lassitude and inefficient work among employes. The fan creates a circulation that energizes the atmosphere and produces greater comfort.

Despite the circulation produced through the action of steam or other radiators, there are always some portions of a fairly large room where the air will remain stagnant without the use of the fan to make it circulate. Thus the fan in winter is a great aid in correcting the atmosphere and in the saving of fuel through the more equitable distribution of warmth from radiators throughout the room, whether in offices, homes, schools or factories. In quite a number of motion-picture theaters, oscillating fans are used for this purpose. In all cases the fans for ventilation should be placed so the current of air from them will not chill the occupants of the room.

Flies and mosquitos are pests of the summertime whether the weather is extremely hot or not. The fan may be used to drive them away from food, from the sleeping infant or from other persons, for these insects will not remain where there is a good breeze. The fan on a summer evening when the air is still will effectively keep mosquitos at a safe distance.

One of the most effective methods of quickly warming a cold room on a winter morning is to turn on the radiator and place the electric fan on the floor with its current of air blow-



Electric Fan in Industry. Drying Varnished Floors. Ventilation by Exhaust Fan.

ing directly against the radiator. In this manner the heat will be more quickly disseminated throughout the room. In homes equipped with hot-air furnaces the fan is of great assistance as a regulator and stimulator. Poor circulation from the hot-air furnace is the rule rather than the exception. Certain rooms receive an insufficient flow of hot air, often because of the direction of the wind, location of the furnace or long runs of hot-air pipe. These defects, as well as those resulting from poor fuel, insufficient draft or grate area, can be largely overcome by placing the fan in front of the ash-pit door or damper so as to direct the air current under the grates. Placed with the motor side next to a sluggish hot-air register, the fan draws the heated air into the room and livens up the whole system.

Fans Aid in Heating and Saving Fuel.

Quick and thorough heating demanded in theaters and other places of public entertainment is greatly aided by the operation of electric fans before the radiators. Offices and garages, whether the latter be heated by stove or radiator, can be made and kept more comfortable with the electric fan to stimulate radiation and distribute the warm air. Show windows in stores may be kept free from frost by the use of a fan for directing the warm air of the interior against the glass. The proper amount of humidity may be maintained in the room by placing the fan so its breeze is directed across a pan of water in which wicks of cotton cloth have been placed.

A physician recently set forth in a large metropolitan newspaper the advantages of utilizing the electric fan for heat regulation. Among his suggestions were the following:

"If the floor is cold, place the fan and tilt it so that the warm air is driven to the floor zone. If the rear of the room is cold, place the fan near the ceiling and blow the hot air from that zone over toward the cold areas. If the space around the radiator is too hot, place the fan so that the hot air is blown away from it and over toward the cold parts of the room. If cold air is leaking through the windward walls, throw air against that wall with the fan. If the window chill is excessive, throw hot air from the radiator against the cold windows."

This physician explained that the complaints of cold are not because we do not burn enough coal or do not keep the temperature high enough, but because the heat is not properly distributed. If a man's head is in a stratum of air that is 72 deg. F. and his feet in one that is 62 deg., he feels cold. For such discomforts an electric fan is a satisfactory remedy.

Use of the electric fan for drying purposes includes the drying of clothes, fruits and vegetables, plaster, paint and varnish, negatives and prints, freshly mopped floors, etc. Along this line the housewife and her daughters find pleasure in drying their hair after washing it in cold or inclement weather by blowing the warm air from the top of the radiator against the hair. Electric fans are also in use in hairdressing parlors for the same purpose. Electric fans have been in use for a number of years in shoe-shining stands for drying shoes after washing and for drying liquid polishes on fine leathers.

Electric Fan for Drying Purposes.

Drying of clothes on washdays by electric fan is proving a boon where space for drying by air and sun is limited, and on rainy days. The fan is effective with or without the aid of heat, since the breeze directed against the clothes drives off the humid air. Many laundries find the use of fans in the drying room very effective in conserving heat, and consequently fuel, since the artificial breeze combined with heat gives the quickest and best drying action. The inconsequential cost of the fan's operations as compared with the cost of fuel effects great economy in drying clothes both in the commercial laundry and the home.

In the process of drying fruits and vegetables by use of the fan they are placed on trays with bottoms of cheese cloth or screening. The fan may be placed so it will blow across the trays or from the bottom upward through a number of trays placed in a rack. Another method is to string the fruit or vegetables and suspend the strings in front of the fan. In any case the fan drying is considered more sanitary, convenient and economical than sun and air drying.

Fans in Show Windows.

In addition to their use for keeping frost from the show windows in the winter, the fan is useful in producing motion in a window display, and it is well known that any kind of motion in a display window adds to its attractive qualities. Thus the fan may be utilized to blow out streamers, flags, ribbons, toy balloons, and to rotate pinwheels, etc.

Displays of fans for sales purposes are easily made attractive, particularly with the use of special settings and suggestions furnished by manufacturers. Usually the background and trimmings for a fan display in the summer time partake of ice caves, snow storms, polar regions and seaside scenes.

The taking of advantage of weather changes

to display the versatility of the electric fan is well illustrated by a dealer who, on an extremely hot day in June, dressed his window to represent the polar regions, with a fan playing on a huge painted thermometer showing low temperature, while opposite stood another thermometer showing approximately the temperature of the day. When the weather turned cold and blustery a few days later the dealer added an electric radiator to the display and arranged the fan to appear as if blowing the warm air toward the high temperature thermometer.

Among the ideas which have been used effectively by dealers, in newspaper advertising during the hot weather, is one that had for its central feature a scene and description of the cooling features of the electric fan. Around this central space was arranged, with the aid of an artist a line drawing or scenic depiction of uses of the fan labeled for every month of the year. July displayed a "North Pole" effect with a fan blowing out an American flag, August depicted the drying of photographic prints with a fan, September suggested the drying of fruits and vegetables, October disclosed the use of the fan for blowing odors and smoke out through the kitchen transom, November showed the method of drying clothes on a rainy day, December showed the use of the fan for circulating hot air from the furnace, January indicated the warming of a room quickly by blowing air against a steam radiator, February illustrated the prevention of frost on a store window, March depicted the fan in use for drying paint and varnish on floors, walls and furniture, April presented milady untilizing the fan to dry her hair on a rainy day, May showed the ventilating of a motion picture theater by oscillators along the sidewalls, June described the blowing of fresh air in a bedroom window on a still night, and also blowing flies away from the baby's cradle.

Comprehensive assistance furnished to the dealer this year by the manufacturer includes copy and cuts for use in newspaper advertising, designs and trimmings for window displays, suggestions and designs for showroom display, signs for delivery wagons and cars, sample letters for various classes of customers, posters for billboards, folders and pamphlets for general distribution, plan for compiling mailing list, suggestions and tentative methods for house-to-house canvass and sales arguments, slides for motion picture houses, etc. These are reinforced with national advertising campaigns in leading periodicals by the manufacturers.

On his part the dealer is preparing himself to advise the customer fairly as to the type and size of fan that should be bought, after a few simple questions have disclosed the use for which it is intended.

Fan Rentals for Profit and Sales.

While central-station companies frequently rent fans during the hot months, as well as using the deferred payment and trial plans to stimulate their sales, this practice does not appear so general among dealers. At least one contractor-dealer, with place of business in Washington, D. C., reports the rental basis a success.

This dealer prepares a schedule of rates that will bring a substantial profit. A deposit covering the retail price of the fan protects him from loss, although he considers the deposit feature rather objectionable from a sales standpoint.

The fans are rented on a 10-week basis. For less than 10 weeks' rental of a fan an extra service charge of 10% of the cost of the fan to cover drayage, etc., is added to the total weekly rental; when the service period is more than 10 weeks this charge is not made. All fans are taken from new stock and cord and attachment plugs are furnished with each fan. Money paid for rental may be applied to the purchase price of the fan at any period, in case the renter decides to buy the fan.

LONG PROGRAM IS ARRANGED FOR ARKANSAS CONVENTION.

The principal address at the thirteenth annual convention of the Arkansas Utilities Association at Hot Springs, Ark., April 26-28 will be made by Gov. Charles H. Brough, of Arkansas, who will speak on "Arkansas' Attitude Toward Public Utilities." This address will be made on the first day of the convention. Other papers to be read and discussed at the convention are as follows: "Lightning Protection," by J. L. Buchanan, president Wesco Supply Co., St. Louis, Mo.; "Underfeed Stokers" by O. P. Barnell, Westinghouse Electric & Engineering Co., East Pittsburgh, Pa.; "Coal versus Oil," by P. W. Thomas, Arkansas Light & Power Co., Pine Bluff, Ark.; "Present Day Operating Problems," by W. G. Schmauder, Texas Power & Light Co., Dallas, Tex., and "State Regulation of Utilities," by Thomas E. Wood, a member of the Arkansas Corporation Commission.

ELECTRICITY IN THE PRODUCTION OF IRON AND STEEL.

At the April meeting of the New York Electrical Society on April 21, Max Albert Whiting of the power and mining engineering department of the General Electric Co., Schenectady, N. Y., spoke on "Electricity in the Production of Iron and Steel." In the talk the course of the ore from the crude state in which it enters the mills to the principal finished products was described. Mr. Whiting also discussed steel mill machinery and told how electric drive is used in the operation of the various types of machines shown.

HARTFORD CONTRACTORS HEAR TALK ON BETTER LIGHTING.

Members of the district association of electrical contractors and dealers of Hartford, Conn., dispensed with regular business at their last meeting to listen to an illustrated lecture on the subject of "Efficient Illumination," by E. Y. Rice, illuminating engineer for the Hartford Electric Light Co. Figures and tests were presented to prove increased production through better lighting, problems of safety were given consideration and examples of good and poor lighting were pictured on the screen.

Direct-Current Armature Windings —Part II.

Calculations, with Winding and Connection Tables, for Duplex Singly Re-entrant and Simplex Doubly Re-entrant Lap Windings—Discussion of Characteristics of Such Windings

By JACOB GINTZ

Since the diameter of an armature is limited in proportion to its speed, the number of coils in an armature circuit is also regulated by the terminal voltage of the machine. The number of coils on the entire winding will then be equal to the number of coils per circuit, times the number of circuits, plus the number of coils short-circuited by brush contacts. This, in turn, makes it necessary to use more than one strand of wire to wind the various coils; hence the names duplex windings, triplex windings, etc.

In a duplex coil winding, as a general rule, there are twice as many commutator bars as coils, but there are cases where the number of commutator bars and coils are equal. There is an advantage in using twice as many commutator bars as coils as it improves the commutation. It also makes it possible to connect this winding in two ways, as will be explained later.

A duplex winding may be wound in two ways, namely, two wires in hand placing one winding or one wire in hand placing two separate windings. Figs. 13, 14, 15 and 16 will show the method of placing and connecting the above two ways mentioned.

Figs. 13 and 14 are the end view (or working drawing) and the development of a four-pole duplex singly re-entrant lap winding having 16 coils, the winding being shown as when wound with one wire placing two separate windings with two coil sides per slot.

To find the spread or pitch of a coil use the following formula:

$$Y_b = \frac{C \pm A}{P}$$

Where C = No. of coils in complete winding.
A = No. of pairs of armature circuits.
P = No. of pairs of poles.
Y_b = Coil pitch expressed in winding spaces.

Then $Y_b = \frac{16 \pm 2}{2} = \frac{18 \text{ or } 14}{2} = 9 \text{ or } 7.$

To find the distance from the end of any coil

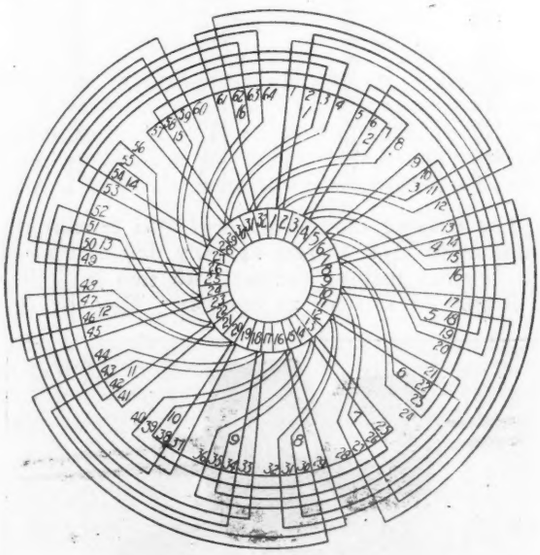


Fig. 13.

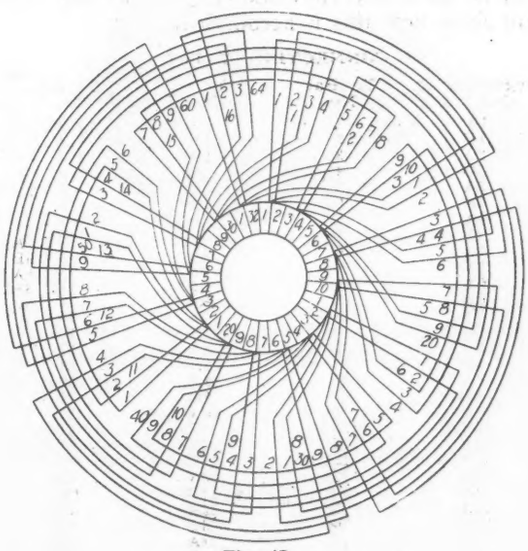


Fig. 15.

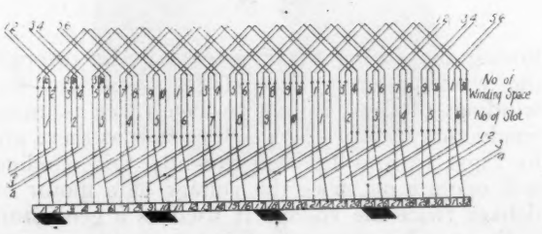


Fig. 14.

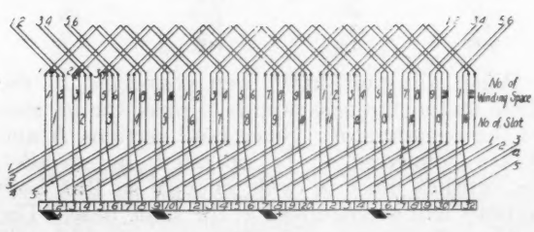


Fig. 16.

to the beginning of the next coil, use this formula:

$$Y_f = Y_b \pm Y_r$$

Where Y_r = Resultant pitch.

Y_f = Front pitch.

Then $Y_f = 9 \pm 2 = 7$, and $Y_f = 7 \pm 2 = 5$.

As above explained, when the values of Y_b and Y_f are all odd numbers it is to the better advantage to use the smaller of the two, so then in this case $Y_b = 7$, and $Y_f = 5$. The following winding table and connecting table show how the windings are completed. The winding will be called section A and B.

WINDING TABLE.

Coils No.	Wound in Spaces No.	In Slots No.
1A and 1B	1 and 8	1 and 4
2A and 2B	3 and 10	2 and 5
3A and 3B	5 and 12	3 and 6
4A and 4B	7 and 14	4 and 7
5A and 5B	9 and 16	5 and 8
6A and 6B	11 and 18	6 and 9
7A and 7B	13 and 20	7 and 10
8A and 8B	15 and 22	8 and 11
9A and 9B	17 and 24	9 and 12
10A and 10B	19 and 26	10 and 13
11A and 11B	21 and 28	11 and 14
12A and 12B	23 and 30	12 and 15
13A and 13B	25 and 32	13 and 16
14A and 14B	27 and 2	14 and 1
15A and 15B	29 and 4	15 and 2
16A and 16B	31 and 6	16 and 3

When all coils have been placed the next step is to find out how the brushes are going to be set, center between pole tips or center off pole. Assume that for this winding the brushes will be set center between pole tips, and for this reason the beginning lead of each coil will be connected straight out to the bar in front of the slot in which it is wound.

As above explained, this winding can be connected to a 16-bar commutator or a 32-bar commutator. For this winding a 32-bar commutator will be used, and the following connecting table will show how this is accomplished.

CONNECTING TABLE.

Beginning of Coil No.	To Bar No.	End of Coil No.	To Bar No.
1A	1	1A	3
1B	2	1B	4
2A	3	2A	5
2B	4	2B	6
3A	5	3A	7
3B	6	3B	8
4A	7	4A	9
4B	8	4B	10
5A	9	5A	11
5B	10	5B	12
6A	11	6A	13
6B	12	6B	14
7A	13	7A	15
7B	14	7B	16
8A	15	8A	17
8B	16	8B	18
9A	17	9A	19
9B	18	9B	20
10A	19	10A	21
10B	20	10B	22
11A	21	11A	23
11B	22	11B	24
12A	23	12A	25
12B	24	12B	26
13A	25	13A	27
13B	26	13B	28
14A	27	14A	29
14B	28	14B	30
15A	29	15A	31
15B	30	15B	32
16A	31	16A	1
16B	32	16B	2

When all leads have been connected to the commutator, the next step is to place the brushes on the commutator. Since both sections A and B are connected to be operated in parallel, the brushes must be wide enough so that both sections will be energized at the same time. The brushes should not cover more than two bars and not less than 1½ bars. This being a four-pole lap winding it will require four brushes (two negative and two positive) for successful operation. The spacing of brushes is found by dividing the number of commutator bars by the number of poles. Then $32 \div 4 = 8$ bars for the spacing of the brushes in this problem. Then by placing one brush so that it makes contact with commutator bars 1 and 2, the next brush will be in contact with commutator bars 9 and 10, or eight bars from the first. The same method will be followed for the remaining two brushes. The above explains one method of connecting this winding. By tracing the direction of flow of current through the winding it will be seen that the two strands or two separate windings placed on this armature are connected in parallel with one another through the brush connections.

This winding may also be connected as shown in Figs. 15 and 16. The winding table will be the same as shown above for Figs. 13 and 14, but the connections to the commutator bars will be somewhat different and are made according to the following:

CONNECTING TABLE.

Beg. of Coil No.	To Bar No.	End of Coil No.	To Bar No.
1A	1	1A	2
1B	2	1B	3
2A	3	2A	4
2B	4	2B	5
3A	5	3A	6
3B	6	3B	7
4A	7	4A	8
4B	8	4B	9
5A	9	5A	10
5B	10	5B	11
6A	11	6A	12
6B	12	6B	13
7A	13	7A	14
7B	14	7B	15
8A	15	8A	16
8B	16	8B	17
9A	17	9A	18
9B	18	9B	19
10A	19	10A	20
10B	20	10B	21
11A	21	11A	22
11B	22	11B	23
12A	23	12A	24
12B	24	12B	25
13A	25	13A	26
13B	26	13B	27
14A	27	14A	28
14B	28	14B	29
15A	29	15A	30
15B	30	15B	31
16A	31	16A	32
16B	32	16B	1

The spacing of brushes will also remain the same as in Figs. 13 and 14, only that instead of the brushes making contact with two bars they will only be as wide as one bar. Then by following or tracing the flow of current through the winding circuits it will be seen that the windings of Figs. 15 and 16 have twice as many conductors in series between brushes as there are in Figs. 13 and 14; consequently this winding will operate on twice the voltage as a motor or deliver twice the voltage if used as a generator.

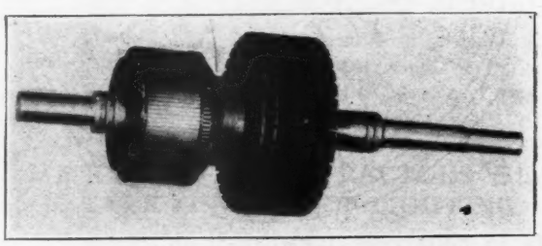


Fig. 17.

Fig. 17 shows an armature core with commu-

tator unwound. Fig. 18 shows a partially wound armature. The winding which is being placed is of the duplex type as illustrated in Figs. 13 to

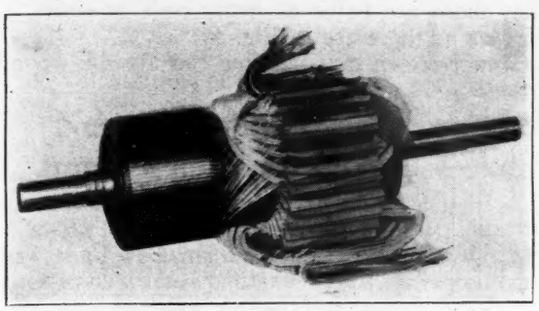


Fig. 18.

16. Fig. 19 is the armature completely wound and connected to the commutator. Figs. 20 and 21 show the front and back views of an armature complete as used in a direct-connected generator or a motor.

Simplex Doubly Re-entrant Type.

The next windings to be treated will be of the simplex doubly re-entrant type; that is, one winding using a single strand of wire will be placed, but it will encircle the armature twice before closing on itself.

This style of winding is somewhat different

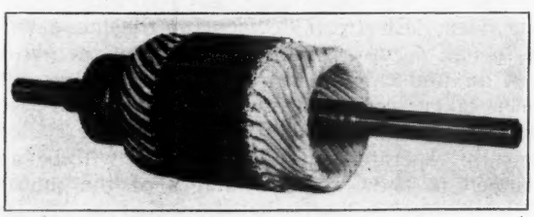


Fig. 19.

from the preceding ones inasmuch as the value of Y_r will be equal to twice the number of re-entrancies or $2 \times 2 = 4$ as the value of Y_r. It is also impossible to connect an even number of coils. If, in the case of a reconnection of an armature winding from singly to doubly re-entrant winding of an armature which is wound with an even number of coils, one coil will have to be dead-ended and then the reconnection made with an odd number of coils.

To illustrate the above style of winding, Figs. 22 and 23 show the end view and development of a four-pole 15-coil simplex doubly re-entrant lap winding, with two coils per slot. Hence it

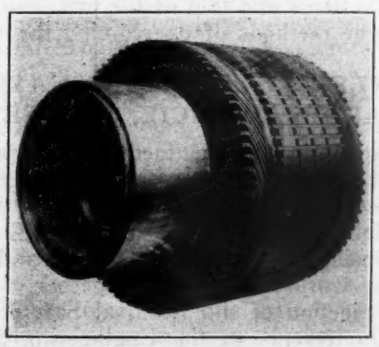


Fig. 20.

will require 15 slots in the armature for this winding.

The spread of the coils in this winding is found by the same formula as in all the preceding problems

$$Y_b = \frac{C \pm A}{P} = \frac{15 \pm 2}{2} = \frac{17 \text{ or } 13}{2} = 8.5 \text{ or } 6.5.$$

The fractions in both of these results will be dropped, and since the remaining values (8 and 6) are even numbers, they are made odd by ± 1; thus $8 \pm 1 = 9$ or 7, and $6 \pm 1 = 7$ or 5 as the four possible values of Y_b. Since the value of $Y_f = Y_b \pm Y_r$, then if the value of Y_b is chosen as 7, $Y_f = 11$ or 3. For reasons previously explained, the working values in this problem will be $Y_b = 7$ and $Y_f = 3$.

The following winding table shows the number of the coil, the winding space and slot into which it is wound or placed.

WINDING TABLE.

Beginning of Coil No.	In Space No.	Slot No.	End of Coil No.	In Space No.	Slot No.
1	1	1	1	8	4
2	5	3	2	12	6
3	9	5	3	16	8
4	13	7	4	20	10
5	17	9	5	24	12
6	21	11	6	28	14
7	25	13	7	2	1
8	29	15	8	6	3
9	3	2	9	10	5
10	7	4	10	14	7
11	11	6	11	18	9
12	15	8	12	22	11
13	14	10	13	26	13
14	23	12	14	30	15
15	27	14	15	4	2

When all coils are placed the next step is to connect the coils to the commutator, which will

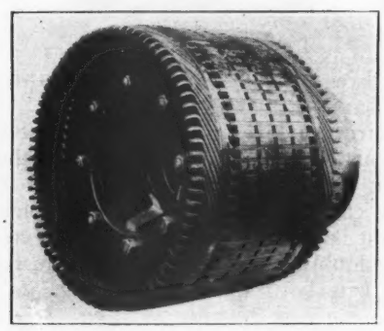


Fig. 21.

have 15 bars for the connection of this winding.

The following connecting table shows how this is accomplished.

CONNECTING TABLE.

Beginning of Coil No.	Connects to Bar No.	End to Bar No.
1	1	3
2	3	5
3	5	7
4	7	9
5	9	11
6	11	13
7	13	15
8	15	2
9	2	4
10	4	6
11	6	8
12	8	10
13	10	12
14	12	14
15	14	2

The brushes in this style of winding should be as wide as about 1½ bars in the commutator, and they will be four in number, this being a four-

pole lap winding. The spacing of these brushes is found by dividing the number of commutator bars by the number of poles, or $15 \div 4 = 3\frac{3}{4}$ bars.

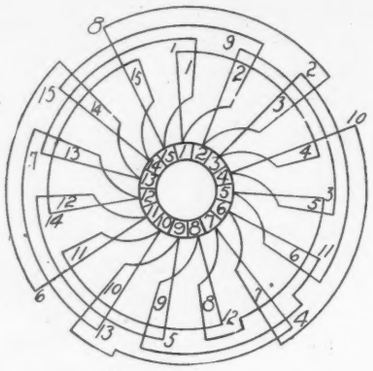


Fig. 22.

Brush No. 1 will be placed so as to make contact full on bar 1 and one-half on bar 2; the next brush will be set so as to make contact one-quarter on bar 4, full on bar 5 and one-quarter on bar 6; the third brush will be set so as to make contact one-half on bar 8, full on bar 9, and the fourth brush will be set so as to make

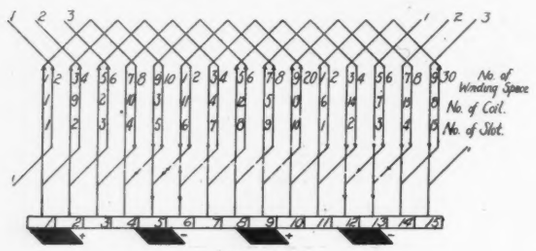


Fig. 23.

contact three-quarters on bar 12 and three-quarters on bar 13.

The direction of the flow of current through the various circuits can be followed by the arrow shown in Fig. 23.

If the case should arise that a simplex singly re-entrant lap winding is to be reconnected for a simplex doubly re-entrant winding the following method can be followed with Fig. 24 as the original singly re-entrant winding.

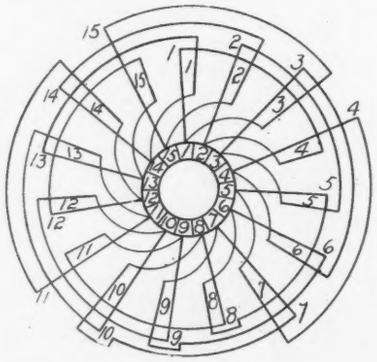


Fig. 24.

Disconnect all coils from the commutator bars so as to have 16 separate coils (32 leads). Then dead-end one of the coils, which will leave 31 for the reconnection for a doubly re-entrant winding, as shown in Fig. 25. The connecting table for this figure will be the same as for Fig. 23.

By comparing Figs. 24 and 25 it will be seen that there are twice as many coils in series in Fig. 24 as there are in Fig. 25.

Doubly re-entrant winding can also be wound

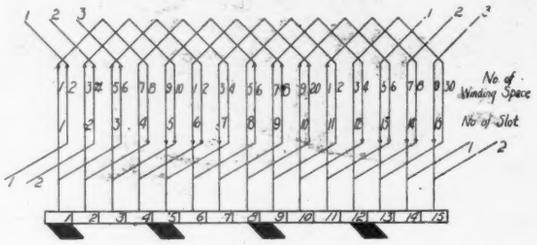


Fig. 25.

two in hand or duplex windings, and by combining the principles used in duplex singly re-entrant and simplex doubly re-entrant winding, it will be a very simple matter to construct an end view or a development winding diagram for these windings.

NEW YORK TO HOLD ELECTRICAL SHOW IN OCTOBER.

New York City's 1920 Electrical Show will be held in the Grand Central Palace Oct. 6-16 and gives promise of being a larger and more representative show than any of the preceding ones. Electrical devices for the home will, as usual, occupy prominent places in the show, but an unusual amount of space this year has been taken by concerns manufacturing electrically operated machines for industrial use. Electrically operated lathes and drills will be arranged to show the advantages of the motor-driven factory over the shop that is encumbered with belts and shafting. A large space has been set aside on the third floor for the demonstration of small industrial trucks for freight handling.

O. B. BLACKWELL MAKES ADDRESS TO SCHENECTADY ENGINEERS.

O. B. Blackwell, transmission development engineer of the American Telephone & Telegraph Co., was the speaker at the meeting of the Schenectady Section, American Institute of Electrical Engineers, April 16, having as his subject, "The Transmission of Telephone Currents." In his address Mr. Blackwell outlined the different systems of long-distance telephony and pointed out some of the essential differences between the various systems and told of the problems met as well as the methods of overcoming them.

ENGINEERING SECTION, NATIONAL SAFETY COUNCIL, TO MEET.

Is engineering a vital factor in accident prevention? Is accident prevention a vital factor in engineering? For the purpose of throwing more light on these important questions and thereby bringing the safety movement and the engineering world more closely together, the Engineering Section of the National Safety Council held a conference at the Engineering Societies building, New York City, April 27.

Machine Switching for Automatic Telephony

New Equipment Developed by Bell Telephone Engineers for Automatic Handling of Calls—Adaption to Present Manual Equipment

In the development of the telephone industry new improvements in telephones, switchboards, lines, cables, office equipment, etc., have followed one another with great rapidity. While each successive type of apparatus sometimes suggested similarity, nevertheless each step in the evolution has marked decided improvements.

From the time of the earliest switchboards there has been a constant effort to perform various operations automatically so far as consistent with the service requirements, and many new features have been introduced from time to time for reducing the work required on the part of the operator. In line with these developments, telephone engineers early applied themselves to the problem of completing calls entirely without the aid of an operator. Many forms of automatic systems have been developed and tried out from time to time, but none of these satisfactorily fulfilled the complicated service requirements of large cities.

An indication of the magnitude of this problem may be secured when it is considered that in New York City, for example, there are at present a total of nearly 1,000,000 telephone stations served from about 90 central offices, and the predictions are that within the next 20 years the stations and central offices will have more than doubled. Each subscriber in this great network must be able to reach promptly every other subscriber. Due to the large area involved a great number of calls within the city involve extra charges, which means that they must be specially supervised and ticketed. There are many different classes of service furnished the public, such as measured rate, flat rate, official, coin-box pay station, attended pay station and other special services such as information, etc. Not only individual lines, but party lines and private branch exchanges must be cared for.

Machine-Switching System Perfected.

As a result of exhaustive investigations and long continued experiments, the engineers of the Bell Telephone System have produced an automatic switchboard which satisfactorily meets these exacting service conditions. As a final step in the development of the system three complete central-office equipments of the machine-switching type were installed at Newark, N. J. These installations were made on what is known as a "semi-mechanical" basis; that is to say, operators were employed to take the calls from the subscribers and transmit them to the machinery by means of numerical keys. It was thus possible to try out this form of apparatus without introducing any new method of calling on the part of the subscriber during the trial installation.

The results of these trial installations demonstrated conclusively that the new machine-switching system would meet all the essential service requirements of the largest cities. The work of manufacturing is well advanced and the first installations will be placed in service early in 1921.

The subscriber's station will be equipped with the usual form of telephone instrument, and in addition with a calling device known as a "dial," (Fig. 1) mounted on the base of the desk stand. When used in the larger cities, the dial will bear certain letters of the alphabet in addition to the numerals, and in the smaller centers numerals only may be employed.

In making a call the subscriber will, of course, refer to the telephone directory, and he will find in the new directory that the central-office name is printed somewhat differently from heretofore. Typical examples of the new form of listing telephone numbers are shown in Fig. 2. These

Fig. 1.—Subscriber's Calling Dial.

conform to the present manual listings, except that the first three letters of the office name are set out prominently. One advantage of this plan is that it does not necessitate the abandonment of all of the existing manual designations. For manual operation it leaves them substantially as at present. For machine-switching operation, the same form of listing is used in the directory, a clear indication being given to the portion of the listing which should be dialed in making an automatic call.

Under this plan machine-switching calls are passed to the central-office mechanisms by dialing the first three letters of the office name and the four numerals followed by the party line designation, if any.

In medium size multi-office cities where six-digit calling is practicable, only the first two letters of the office name will be given prominence in the directory. In very small multi-office cities where only five digits are required, the telephone number may consist of five numerals and no letters may appear on the dial.

This mechanism, which is used to perform the various automatic switching functions within the

office, consists of a so-called "bank," made up of a large number of horizontal brass strips, insulated from each other and piled up so that there may be as many as 300 in one panel, which will comprise the terminals for 100 lines or trunks.

Argent Co, 1400 Bway.....GRE eley 5513
Argentina Brasil & Chile Shipping Co
70 Wall.HAN over 0307
Argentine Genl Consulate, 17 Batry pl..REC tor 6946
Argentine Impt & Expt Corp, Prod Ex...BRO ad 1768
Argentine Mercantile Corp, 42 Bway.....BRO ad 5066
Argentine Naval Commission, 2 W 67..COL mbus 5623
Argentine Quebracho Co, 80 Maiden la....JOH n 1652
Argentine Railway Co, 25 Broad.....BRO ad 1383
Argentine Trading Co, 1164 Bway.....MAD Sq 1871
Argeres Bros, Restrnt, 86 6th av.....SPR ing 5337
Argero A, Grocer, 119 9th av.....CHE lsea 6255
Arghis A, Tobacco, 74 Wall.....HAN over 6311
Argiropie Theodore, Jwlr, 406 8th av..FAR ragut 9772
Argo Packing Corpn, 705 Greenwich...FAR ragut 4505
Argon Dress Co, 24 E 12.....STU yvsnt 2011
Argonaut Supply Corp, 50 Union sq..STU yvsnt 7476
Argonne Steamship Co, 17 Battery pl...REC tor 2493
Argos Ad-Art Co, 1133 Bway.....FAR ragut 5986
Argosy The (A Pub), 280 Bway.....WOR th 8800

Fig. 2.—Typical Examples of New Form of Listing Telephone Numbers.

These strips have projecting lugs on each side to provide contact members, over which vertically operated brushes or elevators ride.

Arranged in front of a group of five panels serving 500 lines, or trunks, are vertical lift rods having triple-contact brushes, which ride over the projecting lugs of the panel. These lift rods can be moved up or down at will and are under definite control by means of the continually moving friction rolls at the base of the frame. Each lift rod has associated with it a system of electromagnets which, when operated to force the flat metallic strip which forms the end of the lift rod against the rolls, will move the rod at slow speed or high speed or will return it to its normal position, depending upon the magnet that is energized. Fig. 3 shows a completely assembled selector frame arranged for 500 lines, or trunks, with 30 elevators or brush rods on each side.

At the top of the frame is a commutator or impulse-making device which has associated with it a brush permanently attached to the lift rod. This is for the purpose of sending out electrical impulses as the brushes pass over the terminals of the bank, and in connection with the "sender" controls the movement of the selecting mechanisms.

At the right-hand side of the selector frame is a row of mechanisms called sequence switches. These are power-driven contact-making devices somewhat on the order of an electric sign flasher, and are used to perform certain circuit-switching functions incidental to the operation of the selecting mechanisms. One of these switches takes the place of a large number of ordinary relays. By simply changing the shape of the metal segments on the cams any desired combination of opening and closing of circuits may be set up as the shaft revolves.

Sending Mechanism.

The subscriber's dial is arranged with ten holes. A complete revolution of the finger wheel will send out ten impulses, and successive operations of the dial will send out successive groups of impulses ranging from one to ten; in other words, these impulses are sent out on a decimal basis. That these impulses may properly select a terminal in the non-decimal group making up the panel, a so-called "sender" is employed. It controls the elevators or selectors in their upward motion toward the terminals of the trunk group or line wanted in such a way as to cause them to arrive at the proper point no matter where the terminals may be located in the selector banks.

When the elevators are started upward the "senders" permit them to go to the desired point and stop them by removing their driving power. This is accomplished through the commutators located at the top of the selector frames which, as the elevators move, transmit back to the "sender" the number of impulses which the "sender" has been set to receive, by the manipulation of the calling device at the subscriber's station. This method of operation is known as the "reverse impulse control" and is an outstanding feature of the machine-switching system.

Method of Completing Telephone Calls.

A schematic drawing of three central offices with the apparatus units so arranged as to show a connection set up from one to another is shown in Fig. 4. The term "line finder," "district," "office," "incoming" and "final" applied to the frames are designations of the uses of the

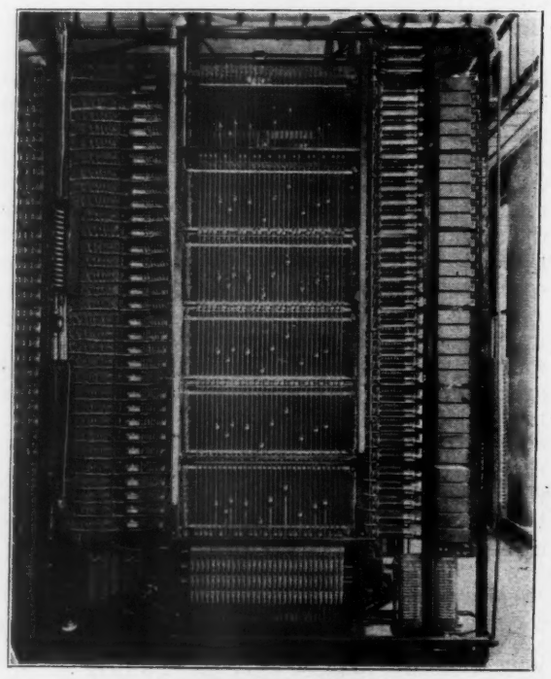


Fig. 3.—Selector Frame, Showing Complete Assembly With Auxiliary Apparatus.

selector frames. Mechanically they are similar and serve to associate connecting brushes with any one of a group of line or trunk terminals. The subscriber's line terminates in a set of multiple bank contacts in the line-finder frame, which contacts correspond to the answering jacks in a manual office. When the receiver is lifted from the switchhook preparatory to dialing, the terminals of the line are selected by a brush of one of the vertically moving lift rods in the line-finder frame, and connected automatically to an

idle "sender" by means of a small selecting mechanism. Upon completion of these operations, which take but a fraction of a second, a tone is sent out to the calling subscriber indicating that the connection is established to the point where he may commence dialing the number. When the subscriber operates his dial the electrical impulses (on a decimal basis) are transmitted to the "sender," which receives and registers them, and in turn translates them to the proper basis for the control of the apparatus which is not operated on the decimal system, and then controls this selection through the apparatus, as referred to below.

As shown in the diagram the calling subscriber is in the GARfield office. When this subscriber starts to dial, the "sender" automatically causes the particular district selector, which is permanently associated with the line finder originally used, to start and select a trunk leading to the office desired, namely, PENnsylvania. This may be done either directly or through an office selector, in case the number of trunk groups is too large to be placed on the district selector. Assuming that the PENnsylvania office is on an

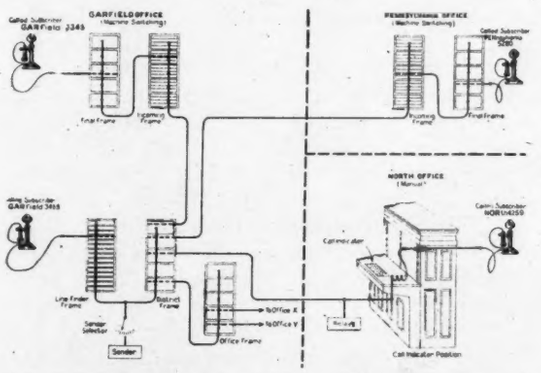


Fig. 4.—Diagram Showing Progress of a Call From An Automatic to Another Automatic or to a Manually Operated Telephone Set.

automatic basis, the trunk chosen will terminate at an "incoming selector" frame and the "sender" above referred to will cause the call to be routed through the "incoming selector" to a "final selector" and thence to the particular line desired. When the connection is thus completed; audible signals will be sent back to the calling subscriber to indicate that the station is being rung or that the line is busy.

If the call had been for another subscriber in the GARfield office it would be routed from the "district selector" to an "incoming selector" in the same office and thence to the particular "final selector" in which the desired subscriber's line is located.

As soon as the subscribers have completed conversation and hung up their receivers, the connection through the automatic machinery is immediately disconnected and the apparatus returns to normal.

If the call from GARfield had been for a subscriber connected with a manual office the "sender" would have so guided the district and office selectors as to have caused them to select a path or trunk leading to the manual office desired, where the trunk would have terminated in a cord before the operator at what is called

Fig. 5.—General View of Machine-Switching Installation.

a "call indicator position." A lamp would have been lighted and the operator upon depressing a key associated with that trunk would have allowed the distant "sender," that is at GARfield office, to cause the numerals of the line desired to be displayed before her on a "call indicator," whereupon she would, by means of a cord, connect the trunk with the multiple jack of the line desired, and ringing would be started automatically. It will be observed, therefore, that so far as the GARfield subscriber is concerned, he is not aware whether the other subscriber is connected to a machine-switching office or to a manual office.

If a call is originated by a subscriber connected to a manual switchboard for a subscriber connected to a mechanical office, it may be handled in a number of ways, depending upon the type of equipment installed. The simplest plan is to place a "B" switchboard in each full mechanical office and let all incoming calls from manual offices be ordered up by the "A" operators over a call wire through this "B" operator. The operator at the mechanical office is known as a "cordless B operator" and establishes all connections to the mechanical

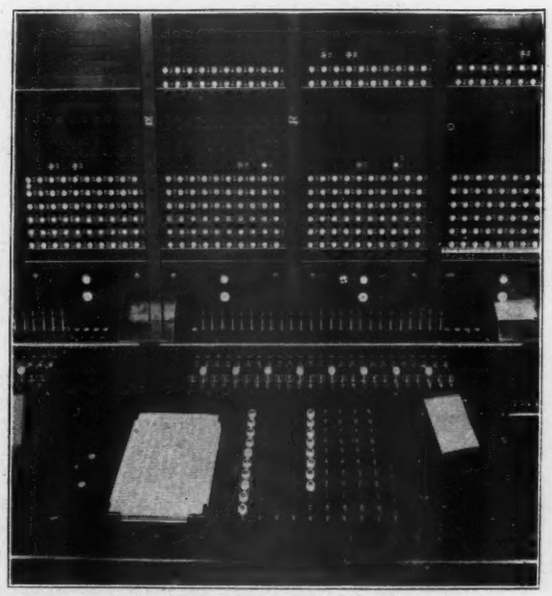


Fig. 6.—Manual Position in Automatic Office Arranged for Semimechanical Operation.

subscribers in her office through the medium of a key set which controls the automatic switches. Other methods of establishing connections from manual to mechanical subscribers are the key-indicator plan and the scheme of equipping each "A" operator in the manual offices with a dial. Both of these plans provide means whereby the

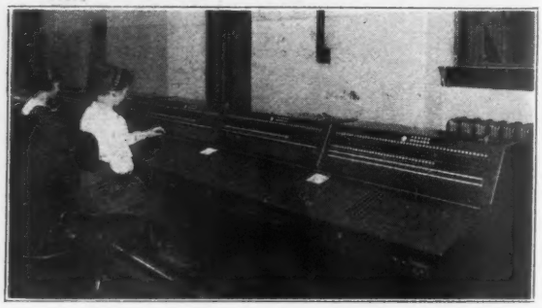


Fig. 7.—Typical Installation of "Cordless B" Positions in a Machine-Switching Office.

"A" operators can complete their own connections in distant full mechanical offices by setting up or dialing the desired numbers.

SOUTHERN CALIFORNIA EDISON IS ALLOWED RATE INCREASE.

Railroad Commission Acts Promptly in Emergency Caused by Subnormal Rainfall Conditions in California, Affecting Hydroelectric Plant Operation.

By its decision No. 7424, the Railroad Commission of California has established a record for promptly meeting an emergency condition threatening the credit of one of the large electric utilities of the state, demonstrating the soundness of public regulations and the mutual interest of investors and consumers alike, in maintaining the public utilities in sound financial condition to permit of financing for new development.

The unexpected subnormal rainfall conditions in California this year, making three successive years of subnormal precipitation, have seriously affected the output of hydroelectric plants in the state, causing unusual increases in operating expenses to make up the deficiency, and because of this the Southern California Edison Co., on Feb. 27, 1920, filed with the railroad commission an application for a temporary increase in its rates. Hearings were held in Los Angeles March 25, 26, 27 and 31, at which all of the cities and farming communities served by the company in Southern California were represented by counsel and the company's case was presented by General Counsel Roy V. Reppy, Vice-President and General Manager R. H. Ballard, Vice-President in Charge of Finance A. N. Kemp, Vice-President in Charge of Business Development-Manager S. M. Kennedy, Mechanical and Electrical Engineer H. A. Barre and Assistant Comptroller D. M. Trott.

Under date of April 15, the commission handed down a lengthy decision allowing the company a temporary increase in all its rates of 27% from April 20, 1920, to Jan. 20, 1921. This increase provides the company with an additional revenue during the period of $2,106,600, in partial compliance with the company's application for a 32½% temporary increase. The temporary rates will be in effect, pending the establishment by the commission of standard rates after a full and complete valuation of the company's properties and investigation of its affairs.

The text of the decision says, in part: "It is vitally necessary for the continued growth and prosperity of the vast territory in Southern California supplied by applicant with electric energy that its full program of development go forward without serious interruption. We believe it to be in the interest of the consumers that they pay rates sufficiently reasonable to enable the company to earn a fair and reasonable return upon the actual investment. Unless this is done it is plain that the utility cannot borrow sufficient funds to carry forward necessary developments. It is of great importance that this program of development go forward. Should there be any halt in this program it is evident that tremendous losses will result to the whole community, if sufficient electric energy is not developed to meet the growing demands.

"It is becoming increasingly evident that the business life of a community such as Southern California is in a very large measure dependent for its growth and expansion, and in some instances even its continued operation, upon electric energy, and as the cost of steam generation is constantly increasing the necessity for the cheaper production of electricity by hydroelectric development has become more and more recognized. Of course, it is not to be understood that the railroad commission urges the payment of unreasonable rates to stimulate investment in this public utility, but when it is considered that to place this company in a position where it can successfully finance will not result at this time in even an 8% return on investment, it will at once be realized that the burden upon the consumer is not unreasonable.

"In considering the granting of an increase in rates of the amount herein contemplated, we are especially mindful of the fact that applicant has been diligently active in the enlarging of its production and transmission facilities since the consolidation of the properties in 1917. It has shown an active determination to carry on development and from the evidence presented, has exerted every reasonable effort to meet the demands of the territory served in the face of difficulties arising from the war period of 1918 and period of readjustment and high cost of money, material and labor which have continued since. Applicant's evidence shows that it has definite plans for the development of both water and steam power for at least eight years in the future, and at an estimated cost of $100,000,000."

I. E. S. TO CO-OPERATE WITH FIXTURE MANUFACTURERS.

At the request of the manufacturers of electric fixtures, the Illuminating Engineers' Society will appoint a committee to co-operate with them in preparing a code of fixture design. The society will prepare technical specifications for the lighting fixtures so that they will be theoretically as well as mechanically correct.

EDITORIAL COMMENT

Theodore N. Vail

The death of Theodore Newton Vail last week removes from life the most forceful personality ever connected with the organization, systemization and expansion of the telephone and telegraph industry, especially in the commercialization of the telephone.

Starting his connection with the telephone industry when it was in its very infancy, Mr. Vail was a commanding figure that made it grow from a few miles of line in 1878 to hundreds of thousands of miles of transmission lines and something like 9,000,000 telephones in operation at the time of his death. It is not going beyond the facts to say that Mr. Vail was alone largely responsible for this wonderful growth, for it was his courage and vision, back in 1878, when he became manager of the first American Bell Telephone Co., that enabled him to foresee that the time would come when communication by means of the spoken voice over a wire would become one of universal practice.

Few persons not closely connected with the telephone and telegraph industry did not realize the driving power of Mr. Vail—not in the sense that he was a hard taskmaster but, rather, the reverse. The driving power came through his vision, his conception and his foresight of what was needed to make the telephone more popular and a means of greater service to the public, and in his ability to impart this feeling to others associated with him. The names of other men, high in the telephone industry, were probably seen more often in the public print than that of Mr. Vail, for he was disposed at most times to sit quietly in his office and plan the policies and activities of the companies under his direction, allowing the credit for the carrying out of these policies and activities to go to his lieutenants.

When Mr. Vail left the railway mail service of the Postoffice Department in 1878 to cast his fortunes with the then unknown and practically untried telephone, friends tried to dissuade him from making the change. It is certain that the government lost a most valuable employe. During the five years he served as assistant superintendent and superintendent of the railway mail service he was responsible for many changes in the methods of handling mail and, in fact, left it a model system when he resigned. Had he remained in the service it is probable that many other departments of the government would have benefited from his wonderful organizing ability.

But retiring, as he did, from one branch of public service to another, he was still in a position to aid the public, although it is certain that, in 1878, few people outside of Mr. Vail had any conception that the telephone in the years to come would become such a servant of the public and such a utility that it rivals the Postoffice Department as an avenue of communication.

His magnificent plans for the wire service of this country were the product of fine imagination controlled by exact knowledge. His project to make every telephone and telegraph station link together the remotest outposts of the country resulted in bringing untold benefits in the way of affording communication.

Mr. Vail's opportunity to retire from active work came when the wire systems were returned by the government to their owners after the cessation of the recent war, and he became chairman of the board of directors of the American Telephone & Telegraph Co. In that position his splendid ability for organization and systemization was still available to the company, but he was relieved of much of the arduous duty that devolved on him as president.

It was less than a year ago that this change was made and Mr. Vail's death comes just as he was starting on a well-earned surcease from a work that in 42 years' time marked him as one of the most able, keenest and, withal, well-liked men that ever held executive positions with public utility corporations in this country. More than that, his death is unfortunate at this time, for his counsel in public affairs was always good and wise and of the sort that is most needed at the present time.

The Dealer Field for Electrical Contractors

Electric shops are rapidly springing up all over the country, particularly those specializing in electric washers and cleaners. There are a number of reasons for this. First is the satisfactory manner in which the electric washer solves the household laundering problems in these times of servant scarcity. Second is the effective way in which the manufacturers of these labor-saving appliances bring them to the attention of housewives through national advertising and generous dealers' helps. Third is the very substantial profit to the dealer in handling these devices. These reasons, and especially the third, are tempting many to enter the field

of appliance merchandising. A considerable proportion of them, unfortunately, are none too well adapted for this business.

Let us consider another condition. In most cities, both large and small, there are electrical contractors of the old type who concern themselves with wiring jobs only. If there is plenty of building they handle new jobs only, often on a ruinous competitive basis. Their profit is precarious, but keeps them going after they have survived a year or two. Many of these men don't know much about merchandising of electrical goods and either for this reason, or for lack of more capital, or because of simple inertia, have never opened a dealer's store in connection with their business. And yet the logical retailer is the contractor-dealer who can supply all the electrical needs of the average citizen, both for wiring and electrical goods of all kinds. It is best for the community that this be so and also best for the electrical industry, as well as best for the contractor and dealer, because a combination wiring and merchandising business has the best load-factor and clearly should be more profitable then either alone.

Summarizing the situation, it amounts to this: Now is an exceptionally favorable time for a contractor to open up a retail store as a distinct feature of his business and an added means of rendering service to the public. If he neglects to avail himself of this opportunity he will presently find the field very generally occupied and the possibilities of fair profit from the retail dealer business greatly restricted. Nearly all communities can still support, and will gladly welcome as a rule, a comprehensive electric shop where all their electrical wants can be adequately supplied. Will the electrical contractor study the situation and seize the opportunity, or will he pass it along to the hardware dealer, plumber and "one-cylinder" electric storekeeper?

Value of Electrical Shows

A very marked interest is now being manifested in the revival of electrical shows. The New York and Chicago shows of last fall were the first to break the depressing spell cast by the war. Cleveland held a splendid show last month. Several smaller cities have conducted similar, but of course more modest, undertakings and even two state universities, Illinois and Ohio, have just held good shows in which the electrical students took the leading part. A large number of electrical expositions are planned for the next few months, and also for next fall. All of the shows held recently are reported to have been more successful than those conducted before the war.

To conduct an electrical show entails considerable expense and work on the part of its managers and exhibitors. The value of the returns is usually difficult to determine, for in many instances little or no effort is made to effect direct sales to the visitors. Because the indirect returns are not readily traced, many firms that should be exhibitors are likely to hold off. And yet they spend thousands of dollars for advertisements in widely read and popular weekly and monthly magazines. We believe that most of the money spent for national advertising is well spent, for it certainly creates interest and aids the retailer. It is generally agreed, however, that to actually see a thing and especially to see it in operation or effectively demonstrated makes a much more permanent and favorable impression than to merely read about it or look at its picture. Consequently, exhibitors at a well planned and conducted show should receive very substantial, even if not immediate, returns.

Aside from creating or stimulating a market for specific electrical goods an electrical show should have the broader mission of keeping the public informed on the latest developments in electrical science and art and therefore keyed up on the progressiveness of the electrical industry. It also should serve to extend the electrical education of the public so that, instead of being awed and terrified at electricity as our forefathers were, we may even in childhood become familiar with its extraordinary serviceability and docility when properly handled. An electrical show affords an excellent opportunity to demonstrate how easily electricity may be handled properly so that the general public may have still more confidence in its practically universal use. At the same time it discloses the newest applications and improvement in the old, and makes even more popular the idea of "Do It Electrically."

These indirect benefits of the electrical exposition are somewhat intangible, but they are far-reaching. This is becoming more and more the age of electricity and whatever can be done to accelerate the movement should be done. We believe that electrical shows can help very materially in this broad educational work in which should share all of the electrical interests—manufacturers, utilities, jobbers, retailers and contractors. To prevent the electrical shows from becoming a burden to exhibitors, however, they should be well co-ordinated as to time and place. Probably the best medium for doing this is the Society of Electrical Development, which incidentally has available a fund of information on the most effective methods of conducting such exhibitions, which should prove of great value to those who undertake them.

CURRENT EVENTS

Reports of Important Meetings, Developments and Other Happenings of the Electrical Industry and Its Allied Interests

NATIONAL ENGINEERING SOCIETIES TO COMBINE EFFORTS.

Presidents and Governing Boards of Four National Societies Meet in Chicago Under Auspices of Western Society of Engineers.

Unification of the work, particularly relating to civic affairs, of engineers and engineer socities was the keynote of a meeting of the presidents and governing boards of the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the Western Society of Engineers, held under the auspices of the latter organization, April 19, at the Hotel La Salle, Chicago. A. Stewart Baldwin, past president of the Western Society of Engineers, presided. The guests at the meeting and dinner numbered over 400, and included many prominent engineers from different sections of the country.

Arthur P. Davis, president of the American Society of Civil Engineers, spoke fittingly of the past achievements of civil engineers and pointed to the future as holding still greater opportunities.

Arthur Thatcher, a director of the American Institute of Mining and Metallurgical Engineers, discussed the economic losses to the world resulting from the recent war and indicated some of the unsound attempts that are being made to accomplish a recovery.

Fred J. Miller, president of the American Society of Mechanical Engineers, outlined the position that he considered fitting for the engineering profession to assume in the public service.

Calvert Townley, president of the American Institute of Electrical Engineers, called on all engineers to unite for the progress and common good of the country. He referred to the training and habits of thought which lead engineers to specialize and work alone on their problems. He pointed out that the tendencies of the times were towards combined efforts and joint operation, and that engineers should change their habits and work and think together to give the greatest amount of service to the city, state and nation. Mr. Townley made it clear that the object of unity among engineers should not be for the advancement of the individual or the profession, but should be for the benefit and good of all. Good citizenship was given as the first duty of the engineer.

In harmony with the other speakers, Mr. Townley called on the 700 organizations of engineers in the country to unite in the formation of an association or federation representing all lines and branches of the profession. The field of endeavor for such a federation would be the consideration and solution of broad questions of public and professional policy. He cited the fact that someone had called the recent war an engineers' war and called on all engineers to make the present peace an engineers' peace of accomplishment.

Dr. Theodore S. Soares, of the University of Chicago, gave an address on "Efficient Democracy." He called on the engineers of the country to step forward and assume the burden of directing the upbuilding of the nation. He described the training and experience of the engineer as fitting him to attack and solve the vast problems involved in the administration of the modern complex public services.

CHANGE IN TIME MADE OF N. E. L. A. "BLUE SPECIAL" TRAIN.

At the request of many persons who wish to visit the Grand Canyon of Colorado enroute to the National Electric Light Association convention at Pasadena, Cal., next month, the transportation committee of the N. E. L. A. has changed the schedule time of the "Blue Special" train so as to allow a sufficient layover at Grand Canyon to visit the scenic spots there.

The "Blue Special" will leave the Grand Central Terminal, New York City, at 5:30 p. m., May 13, and will leave Cleveland, O., at 8:20 a. m., Friday morning, reaching Chicago in time to continue westward via the Santa Fe railroad at 7:35 p. m., Friday, May 14. The train will leave Kansas City at 9 a. m., May 15, and arrive at Grand Canyon May 16. Pasadena will be reached early Tuesday morning, May 18.

Godfrey H. Atkin, assistant master of transportation of the N. E. L. A., announces that no changes have been made in the time or route of the "Pink Special," which will run over the Pennsylvania, Chicago & Northwestern and Union Pacific railroads or in the "Red Special" which is the 30-day tour de luxe in connection with the convention. Requests from the Chicago district for reservations on any of the trains should be sent to Mr. Atkin at room 613, Marquette building, Chicago.

FEBRUARY ELECTRICAL EXPORTS FALL BELOW AVERAGE.

Exports of electrical goods to foreign countries during February amounted to $6,583,228, a falling off of almost $1,000,000 from the figures for February, 1919, when the exports totalled $7,566,216.

However, for the first eight months of the government fiscal year the total exports show an increase of over $7,000,000, the figures being $53,413,133 for the current fiscal year as

against $46,395,581 for the eight months ending Feb. 28, 1919. For the same period in 1918 the exports totalled $34,773,698. Reports from manufacturers indicate that export trade is again picking up and it is expected that by the end of the government fiscal year, June 30, 1920, the total will be well over the $100,000,000 mark.

The figures above are taken from the monthly summary prepared by the United States Bureau of Foreign and Domestic Commerce. The following classified figures give the detailed data for February, 1920, compared with the corresponding month last year:

	1920.	1919.
Batteries	$ 526,972	$ 420,551
Carbons	76,586	161,117
Dynamos or generators	363,340	387,445
Fans	79,780	121,003
Heating and cooking apparatus	140,020	71,136
Insulated wire and cables	567,036	710,830
Interior wiring supplies, including fixtures	195,514	211,415
Lamps—		
Arc	172	2,204
Incandescent—		
Carbon filament	9,746	16,658
Metal filament	363,391	403,379
Magnetos, spark plugs, etc.	251,876	256,280
Meters and measuring instruments	219,454	255,495
Motors	825,727	1,107,268
Rheostats and controllers	86,482	16,442
Switches and accessories	381,203	189,669
Telegraph apparatus, including wireless	16,750	129,596
Telephones	253,457	333,180
Transformers	295,185	401,594
All other	1,930,537	2,370,954
Total electrical machinery, etc.	$6,583,228	$7,566,216

The bureau has also issued a summary of the value of merchandise imported into the United States during 1919 and in this connection it is interesting to note that the total value of electric lamps, including arc and incandescent, imported into this country during 1919 was $212,233, while the exports of lamps by manufacturers in this country totalled $4,893,890 for the same period. Lamps are the only item pertaining to the electrical industry mentioned in the import summary.

THEODORE N. VAIL, TELEPHONE EXECUTIVE, DIES.

Chairman of Board of Directors of American Telephone & Telegraph Co. Was Leader in Industry for Over 40 Years.

Theodore N. Vail, chairman of the board of directors of the American Telephone & Telegraph Co., died at Johns Hopkins Hospital, Baltimore, Md., April 16, at the age of 75 years. Mr. Vail was formerly president of the American Telephone & Telegraph Co., leaving that position last June when he became chairman of the board.

Mr. Vail was interested in electricity and its development all his life and was actively connected with the telephone industry from 1878, when he became general manager of the first American Bell Telephone Co. Prior to that he had been in the government mail service, but still earlier in life had been a telegraph operator.

As president of the American Telephone & Telegraph Co., Theodore Newton Vail was the head of the largest telephone system in the world. He was not only its nominal head, but he was from the very start the genius that promoted the popular use of the telephone, and the establishment of long-distance telephone communication. When well past 70 years of age he was still the initiative head of a system that numbers over 9,000,000 telephone subscribers and represents an investment of over $1,500,000,000.

When Dr. Alexander Graham Bell invented the telephone Mr. Vail was 31 years of age and was holding the responsible position of general superintendent of the United States railway mail service, but through his general interest in electricity the telephone, Bell's "toy," as it was called by many, attracted him. He saw the possibilities of electrical communication and had the vision and foresight to see that some day the telephone would play an important part in American life. Mr. Bell and his assistants had great faith in Mr. Vail's organization ability, which he had already shown in the government mail service, and, in 1878, against the advice of many friends, he resigned from the postal service to become general manager of the first American Bell Telephone Co.

At that time even the most optimistic of the backers of the telephone thought that the invention would serve only for local communication, but Mr. Vail already had plans and ideas for its use in long-distance conversation. He inaugurated steps looking toward inter-city communication. The first line, from Boston to Providence, was ridiculed as "Vail's side show," but some of the persons who scoffed at that line lived to see Mr. Vail telephone, in 1915, not only from Boston to Providence but from New York to San Francisco. In October that same year they found it was possible to make the human voice heard more than half way around the world, as was done by wireless telephone from the government station at Arlington, Va., the words being recorded simultaneously at Honolulu in the mid-Pacific and at the Eiffel Tower in Paris.

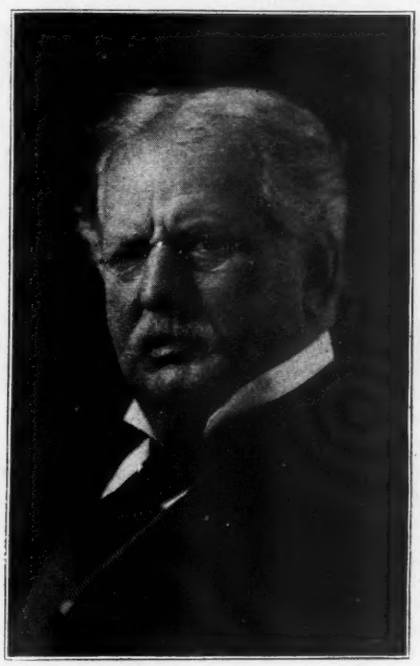
Mr. Vail was known as "the biggest telephone man in the world," not only in tribute to his genius for both financing and mechanical organization, but from the fact that he was personally a man of large physique.

He was born in Carroll county, O., July 16, 1845, of Quaker ancestry. His father, Davis Vail, removed to Morristown, N. J., when the son was four years old, and became associated with a brother, Stephen Vail, who had founded the Speedwell Iron Works, near Morristown, where much of the machinery for the first transatlantic steamship was built. Alfred Vail, another brother, was one of the men associated with Samuel F. B. Morse in the invention and promotion of the telegraph. Mr. Vail was educated in the Morristown Academy, and for a time studied medicine, but, becoming interested in the telegraph, he learned to operate the key and in 1868 went to Pine Bluffs, Wyo., where he became operator for the Union Pacific railroad, which had not yet been completed. In 1869 he was appointed a clerk in the railway mail service, and here his ability to organize and systemize was first shown.

The railway mail service was in an undeveloped state and Mr. Vail prepared special studies on the distribution and dispatching of the mail which brought him quick recognition from

the authorities in Washington. It was just after he had been promoted to the general superintendency of the railway mail service that he acted against the advice of his friends, and accepted the position of general manager of the Bell company.

The task of making the telephone a universal convenience was undertaken by Mr. Vail, and it was upon his initiative that advantage was taken of every possible improvement in order to better the service. In 1885 he resigned from the original company and became the first president of the newly formed American Telephone & Telegraph Co., which first specialized in long-distance communication, but which, in 1900, acquired the property of the American Bell Telephone Co. and later negotiated combinations with the principal competing telephone companies throughout the country, so that the whole



Theodore N. Vail.

service came largely under a single central administration.

In 1890, Mr. Vail retired from the telephone business, purchasing a farm at Lyndonville, Vt., and interesting himself in agriculture. In 1893 he made a trip to South America and, with his customary foresight, saw the possibilities of the Argentine Republic. He obtained a concession near Cordoba from the government, built an electric power house there, purchased a horse-car line in Buenos Aires, converted it into a trolley line, formed a company and equipped it with the best cars obtainable in the United States, bought out all the competing lines, and gave the city a complete modern service. The company was composed largely of British capitalists, and for some time Mr. Vail made his headquarters in London. When he returned from these activities in 1904 he went to his Vermont farm, but in 1907 he was called on to again enter the telephone field as president of the American Telephone & Telegraph Co., of which he had been the first president. He remained president for 12 years and a year ago was made chairman of the board of directors, which position he held at the time of his death.

MATERIAL HANDLING MACHINERY MEN NAME NEW OFFICERS.

Charles F. Lang Is New Head of Organization—Calvin Tomkins and Edward F. Carry Given Honorary Memberships.

At the last meeting of the board of directors of the Material Handling Machinery Manufacturers' Association, held in New York City, April 6, the following officers were elected for the ensuing year: President, Charles F. Lang, Lakewood Engineering Co.; vice-president, Rumsey W. Scott, Otis Elevator Co.; treasurer Lucian C. Brown, Elwell-Parker Electric Co.; secretary and manager, Zenas W. Carter; members of the executive committee, Fred Stadelman, Wellman-Seaver-Morgan Co., and William F. Merrill, the Lamson Co.

The members of the board of directors are Henry W. Standart, Northern Engineering Works, J. C. Walter, Alvey Ferguson Co.; D. V. Jenkins, Watson Elevator Co.; Roy G. Owens, Lakewood Engineering Co.; Thomas Robins, Robins Conveying Belt Co.; G. O. Helmsteadter, Hyatt Roller Bearing Co., and C. W. Miller, Jeffrey Manufacturing Co.

The retiring president, Calvin Tomkins, was elected to an honorary membership as an appreciation of the association for his work as president during the first year's life of the association. A similar membership was voted to Edward F. Carry, who was instrumental in the formation of the organization.

REPUBLICANS MAY GIVE SUPPORT TO JONES-REAVIS BILL.

According to a report made by Gov. Emmet D. Boyle of Nevada, there is a movement on foot in the western states to have incorporated in the Republican national platform at the June convention a plank advocating co-ordination of the public works functions of the government under one department. It is not proposed to create a new cabinet officer but to rearrange those now existing by placing the public works branch of all existing departments in the Department of the Interior. This is in line with the Jones-Reavis bill, now before Congress, which would supplant the present Department of the Interior with a Department of Public Works.

MANHATTAN BOROUGH PRESIDENT TALKS TO ELECTRICAL CLUB.

Henry H. Curran, president of the Borough of Manhattan, was the guest of honor and principal speaker at the monthly luncheon of the New York Electrical League, held April 15 at the Hotel Astor, New York City. Clarence H. Fay, commissioner of public works, New York City, also spoke. Both the speakers discussed building projects now under way in New York City and told of steps that are being taken to improve the borough.

Columbus Electrical Show a Success from the Standpoint of Both Exhibitors and Public

Many Novel Features Marks Fourth Exposition of Electrical Industry in Ohio City — Students Show "Freak" Apparatus and Appliances

Both from the standpoint of the public and of the exhibitors the fourth electrical show held in Columbus, O., which closed a week's exhibition on April 10, was the most successful ever conducted in that city. The show provided plenty of interest for the visitors, while the exhibitors expressed themselves as more than satisfied with the results obtained.

Columbus has been the scene of three previous electrical shows, in 1911, 1914 and 1916, when the electrical engineering department of the Ohio State University and the university branch of the American Institute of Electrical Engineers were in charge. The 1920 show was under the auspices of the university electrical engineering department working in conjunction with the Columbus Electrical Contractors and Dealers Association.

Representatives of the two bodies met several months ago and organized to arrange and conduct the show. Members of the association who were active in the work of the executive board include: A. E. Loeb, Avery & Loeb Electric Co., general chairman; W. S. McGarrity, Sackett Mine Supply Co.; T. M. Jones, Northern Electric Co.; J. C. McMaster, McMaster Electric Co.; Chas. Weisz, Weisz & Brooke Electric Co.; W. A. Wolls, Columbus Railway, Power & Light Co.; O. L. Jeffries, Electric Sales Co.; M. A. Pixley and V. G. Eastman, Erner & Hopkins Electric Co. For the University of Ohio engineering department, the representatives were Prof. C. A. Wright, and J. H. Roebuck and R. H. Frankenberg, members of the class of 1920. For three months the members of the board met once each week to complete the organization and arrange all details.

George E. Fern, manager of the show, was successful in creating an interest in things electrical by the novel lighting effects and color schemes used in Memorial Hall, where the show was held. Booths of the exhibitors were well arranged, and the added decorations increased the effect of the general scheme.

Show Well Advertised.

In advertising the show, the committee gained publicity many weeks before the opening of the show by conducting a poster contest with a prize of $50 for the winner. After announcing the closing date of the contest, the time was extended by the committee and additional publicity given to increase interest in the show. In submitting posters the contestants were asked to emphasize "The Spirit of Electricity." Copies of the winning poster were distributed in a novel manner. Students of the university, who were interested in the success of the show volunteered their services and were sent to all cities and villages within 75 miles of Columbus. By this means the posters were given wide distribution and every student was a representative of the show. Considering the attendance of out-of-town people, it is certain that this plan was very efficient. Not only was the cost of distribution quite low, but the results from the work of the students were highly satisfactory. Traveling representatives of the electrical jobbers and dealers also aided in advertising the show.

Prominent in conducting the show and in giving it good personal publicity were the members of the Columbus Contractors and Dealers Association. During the week of the show the individual members devoted all of their time to making it a success and in a large measure the electrical men of the association were responsible for the good impression created upon the visitors to the show. In the booths of the association telephone service and use of rest rooms was offered to all visitors. At all times members of the association were in charge of the booth answering questions and giving information on electrical service. Other activities of the association men were taking tickets, ushering, distributing programs, and assisting in aiding the crowds of visitors to see the exhibit. "The Reason Why" is the title of a pamphlet which was distributed by the association to show visitors. Users of electric service were given information in this pamphlet concerning installation of electrical equipment and proper inspection of new construction.

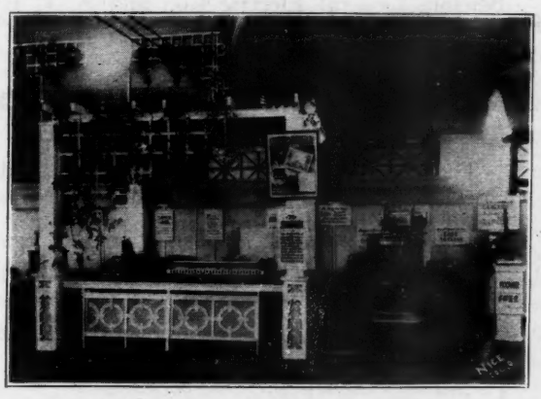
Interesting Electrical "Freaks" Shown.

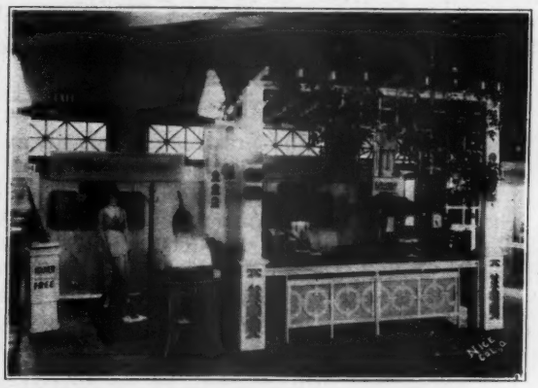
Students of the university, in their booth, which was filled with interesting electrical apparatus, performed many unusual demonstrations and experiments. Few Columbus people had ever seen the apparatus which was displayed and the electrical "tricks" and "freaks" which were shown. Among the many demonstrations were the typewriter which takes dictation and transcribes its notes immediately, electrical frying of eggs on ice, the speaking arc lamp, and the electromagnetic gun. In a corner of the building a mammoth wireless station was installed which received many long-distance messages during the show. Much credit is due the Ohio State University branch of the American Institute of Electrical Engineers for the active part taken by its members in the show and the highly creditable manner in which their work was conducted. Led by Prof. F. C. Caldwell and Prof. C. A. Wright the students did a great deal of the preparatory work of the show.

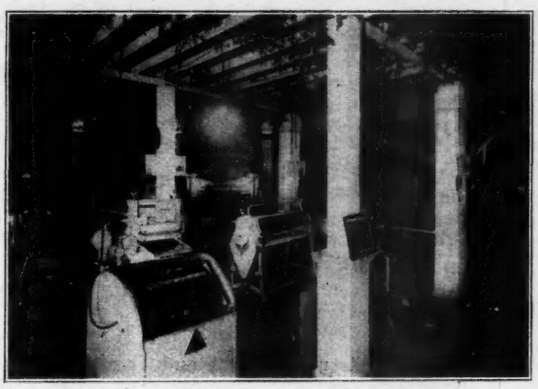
Household appliance exhibitors were greatly interested in the lectures on home electric devices by Catherine Lynn Jackson of the *Ohio State Journal* department of home economics.

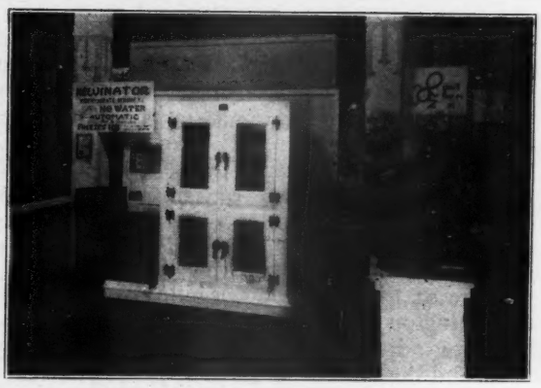
Downtown crowds were attracted to the show by temporary "White Way" lighting with long rows of Mazda C lamps of high wattage on the

Views at Recent Columbus Electrical Show

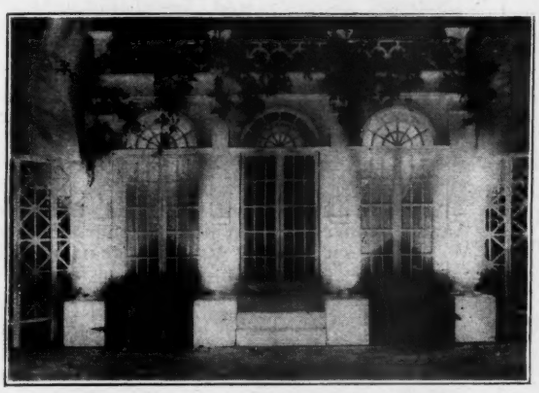


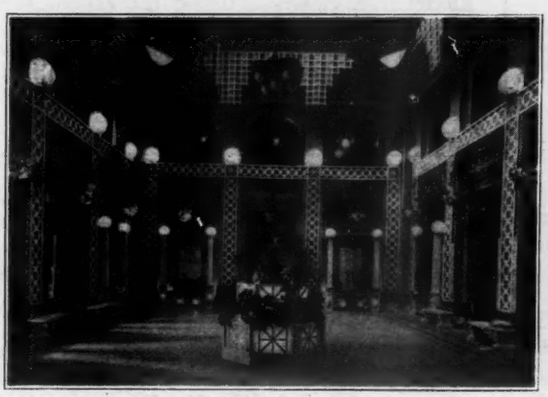






Some of the Striking Exhibits at the Show.





Scenes in Lobby and of Stage of Memorial Hall—Officials of the Show Were: (Standing, Left to Right) T. M. Jones, O. L. Jeffries and W. A. Wolls; (Seated, Left to Right) George A. Fern and A. E. Loeb.

streets leading to the show building, which was illuminated by floodlighting. On several evenings during the week the recruiting station of Columbus Barracks sent to the show a large anti-aircraft projector of 15-kw. capacity,

FIRST SOUTH AMERICAN RAILWAY TO BE ELECTRIFIED.

A contract amounting to nearly $2,000,000 for the electrification of the first main-line railway in South America has been secured by the International General Electric Co.

The electrification is over the line of the Paulista Railway Co. between Jundiahy and Campinas, Brazil, a distance of 45 km., or about 28 mi. The road is of double-track construction. Further extensions amounting to 100 mi. are anticipated.

The equipment will include 12 locomotives, material for the transmission line and substation and a 3000-volt overhead feeder system.

Power for the operation of the lines will be supplied by the San Paulo Light & Power Co. at 88,000 volts, 60 cycles.

It is expected that the new line will be in operation in July, 1921.

ACTION ON WATER POWER BILL IS DELAYED BY CONFEREES.

Despite extended conferences the committees in charge of the water-power bill, now pending in Washington, are making no progress in their efforts to adjust the differences between the Senate and the House on the measure. The fear is expressed that a considerable period will elapse before a compromise can be agreed upon. While few are of the opinion that the bill will fail, it is pointed out that several previous water-power bills have reached the conference committees and remained there.

CHICAGO SECTION, I. E. S., HEARS ADDRESS ON HOME LIGHTING.

"The illuminating engineer, contractor-dealer, fixture maker and all other electrical interests involved must realize that the cost of lighting the home is probably the smallest of all monthly expenses householders are called upon to meet," said M. Luckiesh, Nela Research Laboratory, Cleveland, O., in speaking at the monthly meeting of the Chicago Section, Illuminating Engineering Society, April 21, in the rooms of the Western Society of Engineers.

"The average householder spends more for his car fare, his newspapers and other items that he hardly considers each month than his lighting bill amounts to," continued Mr. Luckiesh, "and the time has come for us to stop talking about the expense of lighting and confine ourselves to educating the public to the benefits of proper lighting in the home." Mr. Luckiesh described the proper methods of installing lamps in different rooms of the household to obtain the best effects.

Otis L. Johnson, chairman of the nominating committee, announced that the following had been nominated as officers of the Section for the next year: Chairman, J. L. Stair, National X-Ray Reflector Co.; secretary, J. J. Kirk, Commonwealth Edison Co.; board of governors, F. F. Fowle, Fowle & Cravath; J. W. Foster, Duplex Lighting Works of General Electric Co.; E. D. Tillson, Commonwealth Edison Co.; Fred Benson, General Electric Co., and A. J. Hunt, the Arnold Co.

MINNESOTA AND SOUTH DAKOTA FORM GEOGRAPHIC DIVISION.

The Minnesota Electrical Association and the South Dakota Electrical Association have combined into what will hereafter be known as the North Central Electrical Association and will also be a Geographic Division of the National Electric Light Association. The ever widening sphere of influence throughout the industry with a desire for a closer co-operation of the various branches of the electrical profession in the northwest section inspired the affiliation. The officers of the new association are T. D. Crocker, Minneapolis, Minn., president; O. A. Rofelty, Sioux Falls, S. D., vice-president, and F. C. Hoffman, St. Paul Minn., treasurer. The executive committee consists of W. H. Ryerson, Duluth, Minn.; Henry Lee, Anoka, Minn., and Fred D. Brown, Huron, S. D.

COMING CONVENTIONS.

Arkansas Utilities Association. Annual convention, Hot Springs, Ark., April 26-28. Headquarters, Eastman Hotel. W. J. Tharp, secretary, Little Rock, Ark.

Electric Power Club. Annual convention, Chattanooga, Tenn., May 5-8. Headquarters, Signal Mountain Hotel. C. H. Roth, secretary, 1416 West Adams street, Chicago, Ill.

American Association of Engineers. Annual convention, St. Louis, Mo., May 10 and 11. Headquarters, Planters Hotel. Secretary, C. E. Drayer, 63 East Adams street, Chicago.

Electrical Supply Jobbers' Association. Twelfth annual convention, Del Monte, Cal., May 12-14. Franklin Overbagh, general secretary, 411 South Clinton street, Chicago, Ill.

Southwestern Electrical and Gas Association. Annual convention, Galveston, Tex., May 13-15. Headquarters, Hotel Galvez.

National Electric Light Association. Annual convention, Pasadena, Cal., May 18-21. Headquarters, Hotel Huntington. Acting secretary, S. A. Sewell, 29 West 29th street, New York City.

Missouri Association of Public Utilities. Fourteenth annual convention, Jefferson City, Mo., June 3-5. Secretary, F. D. Beardslee, St. Louis, Mo.

American Institute of Electrical Engineers. Annual convention, White Sulphur Springs, W. Va., June 29-July 2. Headquarters, The Greenbrier. F. L. Hutchinson, secretary, 33 West 39th street, New York City.

Ohio Electric Light Association. Annual convention, Cedar Point, Ohio, July 13-16. Secretary, D. L. Caskill, Greenville, Ohio.

Pacific Coast Section, American Institute of Electrical Engineers. Annual convention, Portland, Ore., July 21-23.

National Association of Electrical Contractors and Dealers. Annual convention, Baltimore, Md., Oct. 6. Secretary, W. H. Morton, 110 West 40th street, New York City.

CONTRACTING-CONSTRUCTION

A Department Devoted to Various Problems Relating to the Installation, Operation and Maintenance of Electrical Equipment

LOW RESISTANCE IN GROUND CONNECTIONS OF CIRCUITS.

Advantages of Low-Resistance Grounds and Conditions Under Which Such Grounds Are Effective in Protecting Circuits.

At the last convention of the National Association of Electrical Inspectors the following tables were presented as showing graphically the advantages of low resistance in circuit ground connections and the conditions under which such ground connections might be considered effective in protecting the circuits.

CASE I.

Three-wire circuit, fused at 500 amperes, with designed ground on neutral and accidental ground on one outer conductor. 50 volts rise above ground equals limit of safety.

	Ground Resistance in Ohms.		Voltage to Gr.			Fuse Blows.	Safe.
	Outer Accid. Ground.	Neutral Designed Ground.	Outer.	Outer.	Neutral.	Outer.	Yes or No.	Yes or No.
No Protection	1,000	(*)	(*)	0	110	220	No	No
	100	(*)	(*)	0	110	220	No	No
Poor Protection	1,000	100	(*)	100	10	120	No	Yes
	100	100	(*)	55	55	165	No	No
Poor Protection	1,000	10	(*)	109	1	111	No	No
	100	10	(*)	100	10	120	No	Yes
	10	10	(*)	55	55	165	No	No
Fair Protection	1,000	1	(*)	110	0	110	No	Yes
	100	1	(*)	109	1	111	No	Yes
	10	1	(*)	100	10	120	No	Yes
	1	1	(*)	55	55	165	No	No
Reliable Protection	1,000	0.1	(*)	110	0	110	No	Yes
	100	0.1	(*)	110	0	110	No	Yes
	10	0.1	(*)	109	1	111	No	Yes
	1	0.1	(*)	100	10	120	No	Yes
	0.1	0.1	(*)	55	55	165	Yes	Yes

*Infinity equals no ground.

CASE II.

With all other condition as in Case I, but with circuit fused with 50 amperes. Ground resistance of 1 ohm will protect as well as the 0.1-ohm ground, unless above noted conditions.

CASE III.

High-voltage circuit crossed with low-voltage circuit designedly grounded, with high-voltage circuit accidentally grounded and with high-voltage circuit fused at 100 amperes. 100 volts rise above ground equals limit of safety.

	Ground Resistance in Ohms.		Voltage Rise.		
	Primary Accid. Ground.	Low-Voltage Designed Ground.	Low-Voltage Circuit.	Primary. Fuse Blows.	Safe.
Poor Protection	10,000	100	20	No	Yes
	1,000	100	200	No	No
Poor Protection	1,000	10	20	No	Yes
	100	10	200	No	No
Sometimes Protects	1,000	5	10	No	Yes
	100	5	100	No	?
	10	5	700	Yes	?
Protects Generally	1,000	2	4	No	Yes
	100	2	40	No	Yes
	20	2	200	Yes?	Yes?
	10	2	400	Yes	Yes
Always Protects	1,000	1	2	No	Yes
	100	1	20	No	Yes
	10	1	200	Yes	Yes
	1	1	1,000	Yes	Yes

CASE IV.

With all other conditions as in Case I, but with primary fused at 10 amperes, 10-ohm low-voltage circuit ground will protect as well as the 1-ohm ground under above noted conditions.

In all these cases resistance only is considered and the resistance of the circuit conductors and ground wires is excluded as being usually of a low order compared with those listed ground resistances which do not provide an acceptable degree of protection.

The efficacy of the ground depends on its resistance remaining constant or decreasing. If, in case of an artificial ground, the current fails to blow some fuse in circuit and continues in an amount sufficient to dry out the surrounding soil, the resistance will increase and the condition in general will show increased hazard. The advantage of water-main grounds is marked for this as for other reasons.

Safety, as will be noted, is considered as being reasonably assured (1) where a fuse blows immediately to remove the increased voltage hazard from the low voltage circuit or (2) where without the fuse being blown, the voltage rise is not greater than the amount named in the heading.

METHOD USED TO WIRE A ROOM WITH HIGH CEILING.

Wire and Chain Supports Are Used to Suspend Wood Blocks Carrying Conductors and Outlets.

By W. F. PERRY.

An economic scheme of wiring a high-ceiling workroom is illustrated in the method adopted in the case of an evening-class drafting room. The ceiling was 22 ft. high, with a blind attic, making ordinary types of construction rather difficult.

Three strips of 1.5-ins. by 4-ins. oak were drilled, 4 ins. on center for two ½-in. eye-bolts.

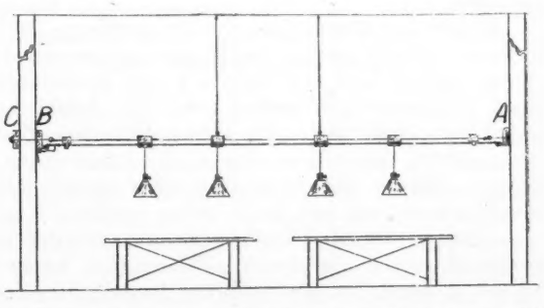


Diagram Showing Construction Used to Wire Room With High Ceiling.

The holes in one strip, shown in the accompanying illustration at *A*, were countersunk to allow room for washers and nuts to set flush. This strip, with eye-bolts in place, was lagged securely to the wall about 12 ft. above the floor. The second oak strip was then lagged in place

on the opposite side of the room and the bolt holes were bored on through the wall. The third oak strip was nailed to the far side of the wall, in position to line up the drilled holes, and eye-bolts were pushed into place and secured with nuts and washers. Two No. 10 iron wires were dead-ended at *A*, threaded through holes in a set of hardwood blocks, dead-ended again a *B* and pulled tight with the nuts on the eye-bolts at *C*.

The loose blocks were then moved along to their proper positions and the wiring operation started. The two conductors were dead-ended at *A* and *C* and cleated to each of the blocks. The circuit was fed through a tap made at *B*. Rosettes supported the drop connections for the individual lamps and light chains, suspended on eye-screws, supported the rosette blocks.

Suitable variations in this scheme make it applicable to places where conduit construction is preferred or required.

STANDARDIZED CONSTRUCTION FOR SERVICE INSTALLATIONS.

Recommendations and Suggestions Made for Standard Methods of Entrance Service Construction.

Vital points and recommendations relative to service construction standardization, presented before a recent meeting of the Ohio Electric Light Association, are outlined below. Brief comments on some of the items illustrate the reasons for their consideration in the planning of standard construction rules.

As an item covering general construction it was recommended that the entrance conduit carrying the service to the meter should be in plain sight. This item was considered important because of the fact that cases of tapping the wires, in concealed conduits ahead of the meter, had come to light in a number of cases. Residence services with their meter connections should, for safety, be inclosed in metal. One style of service box for a particular type of service should be chosen and used exclusively. The service boxes should, when possible, be wired in the shop to save expense and also to insure correct connections.

The service connection should terminate in a location suitable for the installation of the meter. Attics, toilets and coal bins are not considered good locations for meters and so should be ruled out, together with other locations that make access difficult or expose the meter to excessive dirt or moisture. Services should not terminate on porches or in other outdoor locations unless suitable metal boxes are provided to properly protect the meter. Where it is desired to set a meter in the building foundation, for outside reading, a special rustproof box should be used with facilities provided for testing and sealing the meter and for external operation of the switch. Porch meter boxes are recommended for use in summer-cottage construction on account of ease of access. The smallest possible assortment of meters and styles of meter connections should be selected by the parties drawing up standard rules in order to reduce the delays, complications and possible errors in providing meter loops at the termination of the service. Rigid rules against over-fusing are recommended as important for protection to the property in general as well as to the circuits, appliances and the metering equipment. Ground connections should be made directly to water pipes. This rule or standard was laid down as providing for the only reliable method of grounding. Reference was made to observations of artificial ground resistances in Akron, O., averaging 200 ohms for a large number of cases. Artificial grounds include driven rods, pipes and other structures not directly connected to underground water systems.

The standardization of service construction for small power installations is more difficult and not so essential as in residence or large power connections. The principal items to be regulated in the small power installations pertain to metering and so are governed by the type of meters used.

In the case of the customer using primary voltage service it is essential to have a close co-operation between the contractor, the company and the customer. Proper clearance room should be provided at the termination of the service for testing current and potential transformers and for safe access to the main transformers and other equipment. A set of standard designs of terminal vaults for various voltages should be worked out to insure, as far as possible, the safety of workmen employed in handling the equipment in service. Special ventilating arrangements are required for terminal vaults housing transformers. Such ventilation arrangements should be prescribed as far as possible in the standard rules for vault construction. All rules and standards in this class of work should specify construction looking to safety and reliability.

Answers to a questionnaire relative to service installation standards show the uniformity or variation in practice as indicated by 21 replies received from central-station companies. In the average, 67% of all service entrances are through open knife switches. Grounds are made to the neutral wire of a-c. secondaries at the building entrance according to 8 of the 21 replies. Ground connections are made of No. 10 or No. 6 wire or of wire the same size as the house main. In 7 cases, entrance conduits for residences were not allowed to be run within the walls, in 9 cases such construction was allowed, in 2 cases it was allowed on new work and in 2 cases it was allowed only after special consideration.

NEW YORK CITY CONTRACTORS' ASSOCIATION ELECTS OFFICERS.

The Independent Electrical Contractors' Association, of New York, which meets on the first and third Wednesday of each month, elected officers for the ensuing year at its recent meeting. Those elected were: L. L. Strauss, president; W. J. Shore, vice president; C. Montagriff, treasurer; W. Munro, financial secretary; John Perass, recording secretary and Louis Segelbaum, sergeant at arms. The association is continuing its work of developing the Goodwin plan. Meetings, which are open to those engaged in the electrical industry, are held at the Hotel McAlpin.

CONTRACTOR-DEALER

An Exchange of Ideas and Experiences on Advertising and Selling Methods, and Store-keeping for the Dealer in Electrical Goods

DEALERS TO CO-OPERATE WITH CENTRAL-STATION COMPANY.

Standard Window Display for Household Appliance Campaign, Combined with Time-Payment Plan, to Increase Sales.

Following the successful campaign of 1919, during 3 months of which time they sold 10,326 flatirons, 414 percolators and 271 toasters, the Associated Electrical Dealers of Chicago will renew co-operation with the Commonwealth Edison Co. on a more mutually helpful basis that is expected to result in record sales of household appliances as well as an increase in the membership of the association.

This year, in addition to the other successful features of last year's campaign, members of the Associated Electrical Dealers of Chicago will be furnished with screens to form the backgrounds of their window displays. These screens, one of which is illustrated, will be loaned to members of the association by the Commonwealth Edison Co. in order that the window displays of dealers in various localities in the city may be standardized. Newspaper advertisements will link with the design.

The screen consists of three panels and is constructed of beaverboard, which is painted and varnished to increase its durability. Each panel

Design of Standard Window Display for Chicago Electrical Dealers.

is so arranged that the posters, instead of being pasted, are secured firmly in place with fasteners that easily permit the change of posters as frequently as desired. The central poster carries at the top a reproduction of the emblem of the Associated Electrical Dealers, and the screen is intended for members of the association only.

Time-Payment Feature Helps Sales.

The principal feature of the campaign this year—as it was last year—will be the time-payment plan which will be extended to all appliances for household use. In the case of the flatirons, percolators, toasters, curling irons and other small appliances, the initial payment will be $1. The remainder of the price of the article will be collected by the Commonwealth Edison Co. in monthly payments rendered with the customer's electric light bill and payable at any of the company's branch offices throughout the city. The larger appliances, such as washers, sewing machines, etc., will, of course, require larger initial payments.

In any case, the dealer has completed his part of the sales transaction when he has collected the initial payment and turned it over to the Commonwealth Edison Co. Then the dealer can immediately secure his balance, less a slight interest charge, by presenting a form to the dealer's electrical financing company. This form, which is prepared for the purpose and has been indorsed by the jobber, enables the dealer to meet the credit terms of the jobber, thus maintaining his credit standing.

CHAMPAIGN COUNTY ELECTRIC CLUB ORGANIZED.

In order to foster business and social relations between the contractors and dealers and to secure the confidence of the public, a number of contractors and dealers have organized the Champaign County Electric Club, with headquarters at Champaign, Ill. The officers of the club are H. C. White, president; A. R. Summers, secretary, and E. Knabbee, treasurer.

ELECTRIC STORE UTILIZES MOTION-PICTURE SENTIMENT.

Novel Advertisement of Fort Wayne Dealer, Founded Upon Popularity of Feature Films, Offers Another Trade Suggestion.

By Frank H. Williams.

Never have the movies been as popular as at the present time, and never have big pictures been given the exploitation and publicity which now attaches to the showings of productions in leading motion-picture theaters in every city.

Isn't there a chance for enterprising electrical store merchants to cash in on this popularity by associating their establishments with local presentations of special screen pictures?

The Dix-Kelly Electrical Shop, Fort Wayne, Ind., concluded there was such a chance, and that it was good business to take advantage of an opportunity which presented. Consequently this store combined with other local retailers in a rather remarkable advertisement recently when a celebrated feature, entitled, "Male and Female," was presented at a prominent theater in Fort Wayne for an entire week's showing.

The advertisement took the form of a 2-page spread in the local Sunday newspaper. The theater took the chief central advertising space and the retailers took the surrounding smaller spaces. The idea was to have every advertiser play on the title of the picture in the heading of his advertisement. The clever way in which this was done made the spread exceedingly unique. It proved interesting to all the movie fans in the city and attracted a vast amount of attention.

The manner in which the Dix-Kelly Electrical Shop hooked itself up with the title of the play was by the use of an advertisement which read like this:

> Mr. Male to Mrs. Female (the husband to the wife):
> "Why kill yourself with overwork; buy an
> "Electric Vacuum Cleaner
> "And let it do the dirty work."
> A complete line of electrical fixtures and electrical labor-saving home appliances.
> General wiring contractors.
> Dix-Kelly Electrical Shop.
> 216 West Berry Street. Phone 2800.

Needless to say, this store heard a lot from people about the enterprising and interesting way in which the establishment had taken advantage of the opportunity of associating itself with the popularity of the movies, and with the specific showing of that picture. And the more the store heard from the proposition the more it profited in a business way.

Certainly the movies constitute one of the big interests of American people nowadays. The movie theaters are crowded to the doors every night in the week and people talk and think a great deal about pictures. Anything unusual connected with the showing of the pictures in the local theaters always makes a deep impression upon the local movie "fans," and when a lot of retailers advertise with the pictures in some such unique way as this it makes people talk more than ever, and it makes them pay a lot more attention to the advertising for the purpose of seeing in just what novel way the store has adapted the titles of the productions.

The idea is novel. It injects a little life into the advertising and makes it stand out from the general run of publicity. In doing this it is certain to get more attention and prove a benefit to business.

ATTACHMENTS FOR CONVERSION OF VASES INTO PORTABLES.

Among the novelties being introduced this year is a line of inexpensive attachments for converting vases into portable lamps. They are decidedly interesting and should prove fast sellers. One of the attachments consists merely of a toggle arrangement that makes it easy to attach electrical sockets and fittings to any ornamental vase when its owner decides to convert it into a portable lamp. The ease with which it can be centered and its rigidity after it is installed should commend it to the trade. It is made with 3, 4, 5 and 6-in. beveled bells to take vases of many sizes.

Another similar novelty is an attachment which can be used to convert the ordinary candlestick into an electric portable without drilling or tapping the base or doing any wiring. A beveled rubber end fits into the candle holder and is expanded therein by giving the socket end of the attachment a few turns with the hand.

Some Profitable Fields in Every Locality Still Awaiting Development by Electrical Contractors

Systematic Solicitation of Current Consumers Along Streets Served by Central-Station Lines Offers Opportunites for Extension of Business

By GEORGE J. KIRKGASSER

One of the great problems for the electrical contractor and dealer just now is to keep his feet on the ground and not be confused by the quantity and variety of electrical business looming up on all sides. Systematic planning is necessary so that efficiency may prevail and a sound growing business result, with definite assured profits.

Any contractor may extend his business or a new contractor get a start by prospecting for work off the usual path of business. An instance is additional wiring in homes already constructed. The electrical equipments in many of these houses are usually inadequate today. Many have no outlet in the kitchen or laundry for the flatiron, washing machine, etc., but few have adequate outlets for the floor lamps, table lamps, piano lamps, portable radiators, vacuum cleaner and appliances used on the dining-room table.

Let the contractor take a map of his city, town or nearby locality, pick out a street served by the central-station lines and check the residences using electric service. Then if he will follow this lead, or instruct one of his men as to the best procedure, he will get business from a source where none seemed to exist.

House-to-House Solicitation.

One contractor who has tried this successfully made his first call at house No. 1 of those he had checked, announcing that he came simply to make inquiry as to the use of electrical appliances with a view to ascertaining something about how these devices were connected to the circuits. He found in most homes that inadequate means were available. Cords were strung from the ceiling fixtures, side brackets and inaccessible single receptacles, leading to flatirons, toasters, percolators and lamps of different kinds. This was not done because the people had thoughtlessly sought to spoil the appearance of their rooms, but because they knew very little, for instance, about double-outlet receptacles, and

hesitated to have any change made because they thought the cost would be high.

Whenever the contractor found a single receptacle in the kitchen he would show the lady of the house a sample of the duplex receptacle and tell her that it could be substituted for the one she had in about 5 minutes for less than $2. Sometimes the dining room would present a similar problem and he would show her how both the toaster and the percolator, or the fan, could be connected to a duplex receptacle. In the living room it was shown how the duplex would serve a floor lamp and a piano or table lamp at the same time.

After he had talked to her about the great convenience of having adequate outlets, he would propose the addition of receptacles in a number of new locations as, for instance, another in the living room, one in the bathroom for the curling iron and the portable radiator, one for the bedroom—since dresser and floor lamps are now being liberally used in these rooms. If he failed at that time to sell the idea of more wiring and additional outlets, he was at least sure of replacing some of the single-connection receptacles with the duplex receptacles.

The next house might furnish a still better field for replaced receptacles and new wiring. And while the opportunity of talking to the lady of the house presented, it was frequently possible to interest her in electrical appliances or in the attaching of feed-through switches on the cords of her iron, toaster or percolator.

After a few days' work—learning gradually how best to stage his talk—the contractor would make out a report on just what had been accomplished, use it as the basis for a letter and send the letter to every residence on the central-station lines, accompanied by a folder or two. In this letter he would itemize the cost and agree to do the work in the order that the replies were received. In the meantime the regular house-to-house visitations were kept up as before, either by the contractor himself or one of his men whom he had trained for that purpose. Through this work he gained three things: (1) Direct profits from the work done; (2) advertising among the users of electricity, and (3) opportunities for future work.

One contractor in an eastern city by concentrating on installation of additional wiring and an outlet in kitchens only added $380 worth of business in one month.

One good method of advertising has been found by a contractor who called at these residences and left his business card. He found he was very frequently remembered when the need for electrical work arose.

Following Up Calls with Letters

As an example of a letter to residences the following idea, which is taken from a folder that is being furnished dealers by a manufacturer, may be found appropriate:

GETTING THE MOST OUT OF YOUR ELECTRIC LAMPS AND APPLIANCES.

You probably have wished many times that you had convenient receptacles for the connection of your floor lamp, table lamp or fan in the living room, and your sense of orderliness has no doubt been often ruffled by the cords hanging from the fixtures.

The work necessary to eliminate these nuisances and at the same time provide convenient connection outlets in any of your rooms is really not nearly as much as you think.

We can add new outlets quickly and with but little dirt or trouble. Once this is done we know you will thank us every time you use your electrical appliances.

We will give you suggestions and estimates. The cost compared to your appliances is small and a few dollars invested in this way will make it possible to get the best decorative effect with electric lamps and the greatest convenience out of your various electrical appliances.

Installations in Office and Factory.

Fans, motor-driven office appliances of all kinds, vacuum cleaners and many other electrical devices have become necessary equipment in offices. Here again there is to be found need for extensions to the circuits, additional circuits, outlets, switches, etc. In the factory and industrial plant, in addition to the many portable motor-driven and heating appliances, the greater attention given to proper illumination makes this class of customer well worth while cultivating.

These prospective customers can be reached by mail in addition to calls, but it will do little good to simply send a blotter or other novelty. Some contractor-dealers have successfully reached their prospects in this field by taking some one point and telling them in a letter just what the contractor was ready to do. If the offer related to or included the installation of some particular piece of apparatus, there was inclosed a folder or other printed matter which was secured from the manufacturer of such article. Statements of a general nature, such as that the contractor was prepared to do all kinds of wiring, were carefully avoided. Concentration was always made on one or two points in each of a series of letters or calls. In that way all branches of the contractor's work was covered but with a better chance of getting definite results.

INTELLIGENT SERVICE THAT WINS AND HOLDS CUSTOMERS.

Many people, particularly women, are deterred from buying and installing electrical appliances because of timidity toward electric energy itself, and particularly toward new and apparently complicated machinery that is electrically operated. This attitude fortunately does not appear to extend to lighting and heating, but is found frequently to interfere with the installation of sewing machines, washers and wringers, vacuum cleaners and other domestic apparatus operated by motors.

Since this timidity or fear of electricity is more fancied than real, it is being gradually overcome by tactful persistence on the part of the dealer and his salesmen. Dealers generally are now realizing the necessity of overcoming this trait as a part of the intelligent service to be given a desirable customer. Children, of course, are the most apt pupils in the use of electrical appliances, and those now living in homes where electricity is used will be the best customers of the future in the appliance field.

One dealer, who is noted for a goodly number of steady customers, says he never neglects an

opportunity to interest children in the methods of operating and caring for the apparatus and appliances he handles. He says he has found that half an hour spent in showing a young boy or girl the inner workings of a vacuum cleaner or washer frequently leads to substantial sales to the mother. He never considers a sale complete, however, until he has assured himself that the customer thoroughly understands the operation and ordinary care of the apparatus.

This dealer never fails to impress upon the customer, as a part of the service he renders, the simple safety rules for preventing shocks, short-circuits, fires, etc. He says that to him intelligent service, which is more important than making mere sales, includes keeping in touch with his customers and seeing that they are getting the most efficient use out of their appliances.

FIXTURES THAT PERMIT CHANGE OF DECORATIVE TRIMMINGS.

There appears to be a growing field for the sale of fixtures that are so constructed as to permit the housewife to rearrange their decorative features whenever she craves a change. An example of this class of fixture is a lighting unit, the diffusing bowl of which lends itself to a variety of inexpensive trimmings, such as chain festoons, beads and tassels, etc., of different materials and colors. The trimmings are readily attached to or removed from the rim of the bowl. They may be conveniently carried in stock and samples displayed attached to the units suspended from the ceiling of the display room.

DEMONSTRATIONS POPULAR.

Working demonstrations in display windows and exhibit rooms are becoming more popular among dealers this season than ever. Without doubt it is considered the most attractive sort of advertising that can be utilized in the sale of electrical goods. Wherever there is motion in a display window there will always be found a crowd of interested and curious observers—many of them prospective customers.

Most popular among the working displays in electric shop windows at present are washing machines, sewing machines and other units that employ electric power. One simple but effective demonstration used to advertise the electric fan is that of a rocking cradle containing a sleeping doll as large as a baby, on which the air from the fan is directed, the gentle flutter of filmy lace about the babe suggesting cool and comfortable repose.

More pretentious exhibits utilize living persons—usually trim and graceful young women—in the demonstration of electric units for the diningroom or kitchenette. In this kind of an exhibit the story of the tableau is usually augmented by easily read display cards placed in full view of all the observers and changed as often as it is necessary to emphasize the particular points in the use of the various articles.

CLEANING BY ELECTRICITY THE EFFICIENT WAY.

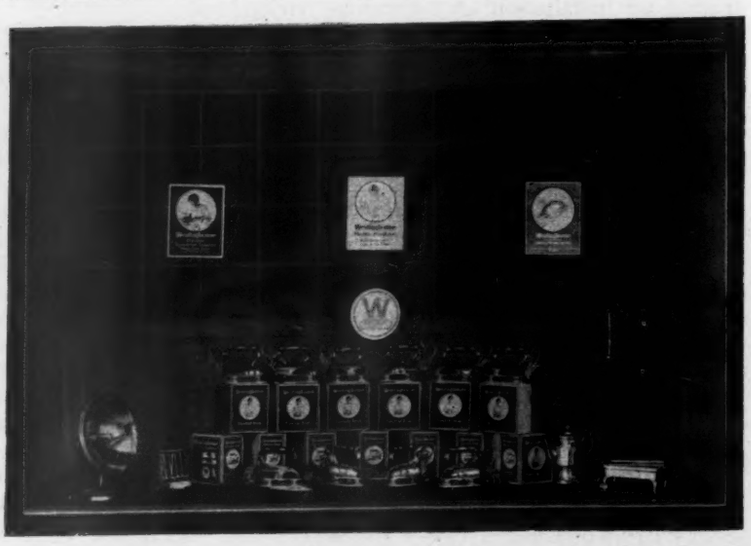
Commenting upon the growing importance of suction sweepers as merchandising and current-consuming factors in the electrical industry, H. W. Hoover, of the Hoover Suction Sweeper Co., North Canton, O., recently made the statement that with the vast amount of educational work done, and the great need for and real merit of the suction sweeper, there is no doubt but that the business both for the manufacturer and dealer is a very permanent one.

"No home owner," said Mr. Hoover, "can afford to use inefficient or dust-distributing methods of cleaning, neither from an economical nor sanitary standpoint. Attention is called to the damage done by imbedded dirt in floor coverings, and also to the rest of the home furnishings through inefficient cleaning methods. Imbedded dirt in floor coverings furnishes a breeding place for disease germs, not the least among which is tuberculosis, and the public is being rapidly educated up to this knowledge.

"There are also many other advantages in the use of the more practical forms of suction sweepers that the housewife appreciates, and because of which she would never revert to inefficient cleaning methods. Such machines help her to solve the servant problem—even to keep her home actually clean without servants or with inferior help."

Effective Window Display of Electric Flatirons.

This simple but effective window display, made up of "the iron that women designed," is being shown by dealers in various parts of the country. The lithographed display packages furnished by the manufacturer, surmounted by a row of electric flatirons, with another row of flatirons across the front, make up the display. Dark paneling and purple trimmings inclose the display, permitting the bright nickel polish of the flatirons to stand out effectively. The three lithographed cards on the background complete the picture.

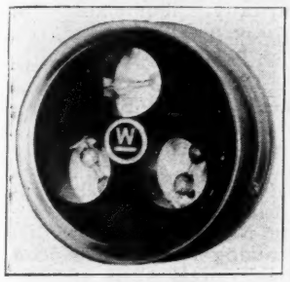


NEW APPLIANCES

Newly Developed and Improved Electrical and Mechanical Apparatus, Appliances, and Devices Now Being Placed on the Market

Electrostatic Glow Meter of Vacuum-Tube Type.

Indication of potential, synchronism and ground detection are the three uses to which a recently developed electrostatic glow meter can be placed, according to the claims of the manufacturer. This device which is made by the Westinghouse Electric & Manufacturing Co., East Pittsburg, Pa., consists essentially of three vacuum tubes. When used for synchronizing a bus and a line or two lines or two busses, the glow meter is connected so that one of the bulbs



Electrostatic Slow Meter.

will not glow at synchronism, while two bulbs glow at half brilliancy. When out of synchronism there is an apparent rotation which is an indication as to whether the incoming line is fast or slow.

Small oil switches may be used for switching these instruments so that it is possible to use one glow meter for a number of purposes. The small bulbs are filled with a rare gas which has the property of giving forth a vivid orange-red glow on an extremely small static discharge. They are mounted on spring clips and are separated from each other by micarta tubing.

Portable Studio Switchboard.

The Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., have produced a new portable switchboard for use in motion-picture studios. It consists of a slate panel on which are mounted six three-pole, single-throw, 125-ampere knife switches. Each switch feeds a three-point Kliegl receptacle and is capable of taking care of one six-way Kliegl spider box. The switches, receptacles and plugs are contained in a No. 12 gauge steel box and two swinging doors permit access to the switches. The doors may be secured and contact with live parts thus made impossible. Connection is made to the main line at the top of the switchboard and all six circuits may be operated simultaneously if required.

The outstanding feature of this switchboard is its portability. It is mounted on four wheels and can be quickly and easily removed from one part of the studio to another.

Westinghouse-Krantz Portable Cabinet Switchboard.

Double-Duty Cluster Fixture Is Simple in Construction.

A double-duty wiring cluster has been placed on the market by the Peerless Light Co., Chicago, and combines simplicity of construction with

"E-Z Wire" Double-Duty Cluster.

artistic construction and service. The cluster is a one-piece casting and admits of superior finish. Its sturdy construction enables it to withstand jarring effects of switching on and off the lights. The cluster is equipped with two pull-chain sockets for individual control of the lamps and in another form it is made with one keyless socket and one pull-chain socket, so wired that both lights are controlled by the one switch.

Electric Water Heater.

A new electric water heater to be known under the trade name of "Hotvent" is being placed on the market by The Aetna Electric Appliance Co., Boston, Mass.

Household and Apartment-Size Electric Ranges.

The Simplex Electric Heating Co., Cambridge, Mass., is placing on the market two new electric ranges designated as Nos. 25 and 29. The No. 25

No. 29 Simplex Household Range.

range is only 29.5 ins. long, 36.5 ins. wide and 22 ins. deep. The oven is provided with a 2000-watt broiler and a 1200-watt bottom heater placed below the flat section, which has three 1200-watt plates. The No. 29 range is a larger equipment and has a separate broiling compartment with a 2000-watt heater and an additional warming oven. This range is provided with four 1200-watt plates. It is 57 ins. long, 54.5 ins. high and 22 ins. deep. The No. 25 range is suitable for a family of 4 to 7 and the No. 29 for a family of 10 to 12 persons. The No. 25 is smaller and the No. 29 is larger than the No. 27 range made by this company.

No. 25 Simplex Apartment Range.

LATEST APPROVED APPLIANCES

Approved by Underwriters' Laboratories, Following Examination and Tests Conducted Under the Standards of the National Electrical Code

Attachment Plugs, Fuseless.—Benjamin Electric Mfg. Co., 120 South Sangamon street, Chicago.

"Benjamin" separable and non-separable porcelain or composition attachment plugs, 660 watts, 250 volts; catalog Nos. 938, 940 and 1001.

Listed Feb. 17, 1920.

Attachment Plugs, Fuseless.—H. T. Paiste Co., 32nd and Arch streets, Philadelphia.

Separable and non-separable attachment plugs having porcelain or composition bases with composition or brass-covered caps; 600 watts, 250 volts; catalog Nos. 1400 and 1423.

Listed Feb. 19, 1920.

Conduit Boxes, Supports.—Detroit File Renewing Co., Detroit.

Formed channel-shaped steel bar with special clamp for securing slotted outlet-plate with flexible tubing knockouts in position. Clamp is provided with malleable iron hickey, and bar has numerous perforations for convenience in securing to joists, etc.

Listed Jan. 29, 1920.

Current Taps.—Bryant Electric Co., Bridgeport, Conn.

"Bryant" or "Perkins," multiple type current taps; keyless, 660 watts, 250 volts; catalog Nos. 4061, KII and MII. Intermediate piece designed to be assembled between cap and base of porcelain sockets; 660 watts, 250 volts, catalog No. 78.

Listed March 9, 1920.

Flatirons. —Manning, Bowman & Co., Meriden, Conn.

Domestic type flatirons; 5 amperes, 110 volts; catalog No. 1436.

Listed Feb. 27, 1920.

Flexible Cord.—Crescent Insulated Wire & Cable Co., Trenton, N. J.

Marking: Red and green threads cabled with copper strands.

Listed Feb. 20, 1920.

Flexible Cord, Portable for Electric Heaters. — Marlin-Rockwell Corp., New Haven, Conn.

Marking: One brown thread between the conductor and insulation. Tag on coil to read: "National Electrical Code Standard."

Listed Jan. 29, 1920.

Fuses, Renewable Cartridge. — Johns-Pratt Co., Hartford, Conn.

"Noark" cartridge inclosed fuses, 0-600 amperes, 250 volts; 0-600 amperes, 600 volts.

Listed March 2, 1920.

Heater, Automobile.—Edison Electric Appliance Co., Inc., 5660 West Taylor street, Chicago.

"Hughes" portable heater with cord and attachment plug for use in preventing cooling water from freezing in automobile radiators, etc.; 200 watts, 110 volts.

Listed Feb. 16, 1920.

Heaters, Car.—Holden & White, Inc., 343 South Dearborn street, Chicago.

Car heaters consisting of inclosed heating units mounted in perforated sheet-metal cases. Cross seat heaters Nos. 300 S. C. and 400 D. C.; vestibule heater No. P. F. 4; truss plank heaters Nos. 500 S. C. and 600 D. C.; panel heaters Nos. 100 S. C. and 200 D. C.; 600 volts or less, 2000 watts or less.

Listed Feb. 27, 1920.

Outlet Bushings, Service Entrance.—E. H. Freeman Electric Co., Trenton, N. J.

"Termilet" porcelain fitting having separate holes for wires, secured to castiron connections threaded for rigid conduit; catalog Nos. 903-F and 913-F.

Listed March 2, 1920.

Receptacles for Attachment Plugs.—Peru Electric Co., Peru, Ind.

Flush Edison receptacles for attachment plugs, screw-shell type; 660 watts, 250 volts; catalog No. 2400.

Listed Feb. 9, 1920.

Receptacles for Attachment Plugs and Plugs. — Bryant Electric Co., Bridgeport, Conn.

"Bryant" or "Perkins" adapters; 10 amperes, 250 volts; catalog Nos. KE and ME.

Listed Feb. 20, 1920.

Receptacles for Attachment Plugs and Plugs.—Russell & Stoll Co., 17-27 Vanderwater street, New York City.

"R. & S. Co.,"; 30 amperes, 250 volts; catalog Nos. 82 and 83.

Listed March 9, 1920.

Receptacles, Medium Base.—Bryant Electric Co., Bridgeport, Conn.

"Bryant" or "Perkins" composition shell; keyless, for use only on switchboards; catalog No. 4117.

Listed March 1, 1920.

Resistance Appliances. — National Electric Controller Co., 154 Whiting street, Chicago.

"National" speed regulators, Type R; 250 volts or less; 45 watts, Size A.

Listed Feb. 12, 1920.

Rosettes, Fuseless.—H. T. Paiste Co., 32nd and Arch streets, Philadelphia.

"H. T. P. Co." fuseless rosettes; 3 amperes, 250 volts; catalog Nos. 1174-75.

Listed Feb. 19, 1920.

Signals, Bells.—Stanley & Patterson, 23 Murray street, New York City.

"Faraday" bells, 250 volts or less; types A, B. and C. "P. R. Marlo," 250 volts or less; giant steel-clad gongs; weatherproof giant castiron-clad gongs; transformer giant steel-clad gongs; weatherproof transformer giant castiron-clad gongs. "P. R. Marlo", 12-18 volts; giant wood box gongs.

Listed March 9, 1920.

Signs.—Crescent Electric Sign Co., 36½ Stanton street, New York City.

Electrically illuminated display signs for general use.

Listed Feb. 17, 1920.

Sockets, Medium Base. — General Electric Co., Schenectady, N. Y.

"G. E." porcelain shell medium base sockets. Key; catalog Nos. GE1275 and GE1286. Key; 660 watts, 250 volts; catalog No. GE1276. Keyless; catalog Nos. GE1277 and GE1287. Pull; catalog Nos. GE1284-85.

"G. E." metal shell medium base sockets. Key, catalog Nos. GE1257, GE1262, GE1266 and GE1269. Key; 660 watts, 250 volts; catalog No. GE1261. Keyless; candle socket when installed with casing, catalog Nos. GE1258, GE1263, GE1267 and GE1270. Pull; catalog Nos. GE1259, GE1264 and GE1268. Pull; 660 watts, 250 volts; catalog No. GE1260.

Listed Feb. 10, 1920.

Switch Boxes. — Detroit File Renewing Co., Detroit.

Sheet-steel, single and gang-type boxes for mounting switches and attachment-plug receptacles; flexible tubing pattern.

Listed Jan. 29, 1920.

Switch Boxes.—Habermaas & Delporte, Inc., 325 Locust street, St. Louis.

"Allino" sheet-steel, single and gang-type boxes.

Listed Feb. 10, 1920.

Switch Boxes.—Toledo Metal Products Co., 956 Spitzer building, Toledo, O.

"B. G." sheet-steel, single and gang-type boxes for mounting switches and attachment plug receptacles; flexible tubing and conduit patterns; catalog Nos. 500, 502-06 incl., and 508.

Listed March 4, 1920.

Switches, Inclosed—Trumbull Electric Mfg. Co., Plainville, Conn.

"Circle T," two, three and four-pole knife switches and cutout bases for standard plug or cartridge-inclosed fuses; 30, 60, 100 and 200 amperes, 250 volts, a. c. and d. c., and 500 volts a. c.; catalog Nos. 14650-69 inclusive.

Listed Feb. 18, 1920.

ACTIVITIES IN THE TRADE

Business Developments, Sales Agencies, Trade Literature and Miscellaneous Items Concerning Electrical Manufacturers and Allied Business Interests

J. & M. Electric Co., Utica, N. Y., manufacturer of electrical specialties, has been reorganized with an active capital stock of $111,000.

Union Electric Steel Co. has moved its general offices from the Keystone Bank building, Pittsburgh, Pa., to its works at Carnegie, Pa.

Starobin Electrical Supply Co., 101 4th avenue, New York City, has increased its capital stock from $30,000 to $100,000, for general business expansion.

Wireless Equipment Co., 19 Park place, New York City, has been reorganized with an active capital stock of $16,500 to manufacture wireless equipment.

Cook Electric Co., Newark, N. J., has had plans prepared for the erection of a new 1-story brick factory, about 22 by 95 ft., to be located at 360 Jelliff avenue.

Phillippe & Crowther, San Antonio, Tex., have opened an electric shop in that city and will do electrical contracting and repairing, and sell appliances and fixtures.

Square D Co., Detroit, Mich., has acquired the lease of Frank E. Moeck of the Peru Electric Co., and all future operations will be in the name of the Square D Co.

Radio Corp. of America, New York City, has completed negotiations for the leasing of the entire third floor of 326 Broadway, at an aggregate rental of about $100,000.

Diamond Electrical Specialties Corp., New York City, has filed notice with the Secretary of State of an increase in its capital stock from $33,000 to $90,000 for business expansion.

Luthy Storage Battery Co., 215 Emmett street, Newark, N. J., has filed plans for the construction of a new 1-story battery manufacturing building to be located at 260 Wright street. The company plans the removal of its works to a new building in Frelinghuysen avenue.

Crown Electric Manufacturing Co., Brantford, Ont., will build an addition to its plant at an estimated cost of $15,000.

Ulmer Circuit Breaker Co., Louisville, Ky., manufacturer of electrical equipment, has increased its capital stock to $100,000. Plans are being prepared for enlarging the plant.

J. Livingston & Co., 70 East 45th street, New York City, manufacturer of electrical fixtures, etc., has increased its capital stock from $450,000 to $600,000, for general business expansion.

Star Fuse Co., Inc., 290 Church street, New York City, is sending a new price-list pamphlet to the trade giving the latest quotations on the renewable fuses manufactured by the company.

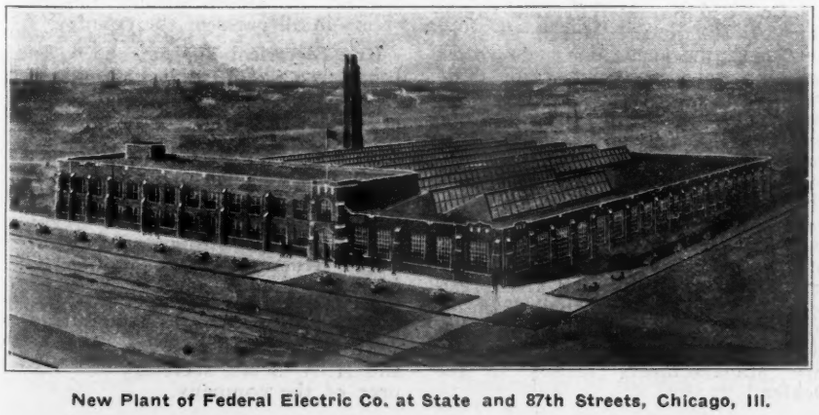
Monroe Lamp Co., 310 West 14th street, New York City, has filed notice with the Secretary of State of an increase in its capital stock from $100,000 to $250,000, for general business expansion.

Locke Insulator Co., Le Roy, N. Y., manufacturer of porcelain insulators, etc., has completed arrangements for the installation of two additional kilns at its Le Roy plant, for increased operations.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has issued its centrifugal pump users' guide for April, in which is contained information of pumps the firm has on hand available for shipment within 30 days.

Continental Fibre Co., Newark, Del., has issued a booklet giving general information about the products of the company consisting of vulcanized fibre, bakelite-dilecto and Continental-bakelite insulation materials.

Chicago Fuse Manufacturing Co., Chicago, Ill., manufacturer of "Union" fuses, has removed to its new office and factory, Laflin and 15th streets, where the company has much larger quarters and increased facilities for production.



New Plant of Federal Electric Co. at State and 87th Streets, Chicago, Ill.

Phono Motor Manufacturing Co., Inc., 325 Dean street, Brooklyn, N. Y., manufacturer of motors for talking machine service, etc., has filed notice with the Secretary of State of an increase in its capital stock from $25,000 to $100,000, to provide for general business expansion.

Electric Furnace Construction Co., Philadelphia, Pa., reports the successful starting up of "Greaves-Etchells" electric furnaces at the following works; Dodge Steel Castings Co., Philadelphia, Pa.; American Radiator Co., Buffalo, N. Y., and Hammond Steel Co., Syracuse, N. Y.

Driver-Harris Co., Middlesex street, Harrison, N. J., manufacturer of wires, wire products, etc., has awarded all contracts in connection with an addition to its shipping building, to facilitate operations. The John W. Ferguson Co., Paterson, N. J., has the general construction contract.

Union Insulating Co., Parkersburg, W. Va., manufacturer of insulating specialties, has awarded a contract to the Liberty Contracting Co., 103 Park avenue, New York City, for the erection of a new 1-story plant, about 80 by 216 ft., estimated to cost $100,000, including machinery and equipment.

Standard Electric Welding Co., Philadelphia, Pa., has moved its works from Emerald and Firth streets to larger quarters at 1939 East Sergeant street, to provide for increased operations. The company is considering plans for the immediate installation of new welding apparatus at the new location.

Lux Manufacturing Co., 123 East Kinney street, Newark, N. J., manufacturer of tungsten and nitrogen lamps, is planning for the construction of a new addition to its plant, to double the present capacity. The new structure will comprise about 40,000 additional sq. ft. of manufacturing area, 4-stories in height.

Federal Electric Co., Chicago, has moved into its new plant at 87th and State streets, after having outgrown its plant at Lake and Desplaines streets. The company was incorporated in 1901 for the purpose of manufacturing and selling electrical signs, but in 1906 the company started the manufacture of a vacuum cleaner and in 1912 followed this with a washing machine, both of which have been very successful. In addition the company now manufactures dish-washers, fuses, sirens, electric lanterns, porcelain sockets and bushings and other devices. Samuel Insull, president of the Commonwealth Edison Co., is chairman of the board of directors of the Federal Electric Co., other officers being John F. Gilchrist, president; James M. Gilchrist, secretary and treasurer; Herbert I. Markham, general manager, and C. B. Graves, sales manager.

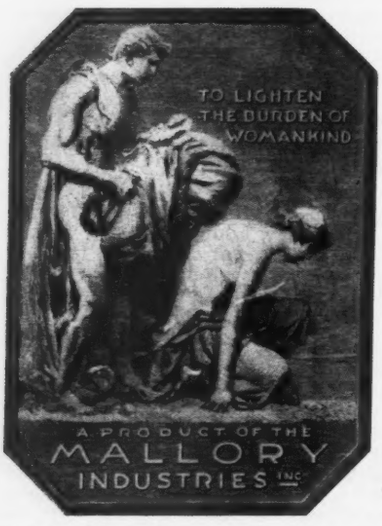
Harvey Hubbell Co., State and Bostwick avenues, Bridgeport, Conn., manufacturer of switches, plugs, etc., has had plans prepared for the construction of a new 4-story reinforced concrete plant, about 60 by 225 ft., to be located at State and Lesbia avenues.

Roller-Smith Co., 233 Broadway, New York City, manufacturer of electrical instruments, meters and circuit-breakers, announces the removal of its Cleveland office from the Williamson building to the Vickers building, Euclid avenue and 65th street. J. E. Wood continues in charge of the office as district manager.

American Ever Ready Works of National Carbon Co., Inc., Long Island City, N. Y., announces the appointment of H. S. Schott as eastern sales manager. Mr. Schott has been connected with the company since 1913 and prior to his promotion was assistant sales manager of the Canadian Ever Ready organization.

Illinois Testing Laboratories, Inc., Chicago, Ill., has moved into new and enlarged quarters at 430 South Green street, the change in location being made necessary by the increase in business. While with its present equipment it is able to repair and test all makes of commercial instruments and meters, it is the intention to make the new laboratory the largest commercial electrical laboratory in the Chicago district.

Crystal Division, Mallory Industries, Inc., Detroit, Mich., has issued two handsome catalogs describing the Crystal washing machine and explaining the thought which lies back of "To Lighten the Burden of Womankind," the Mallory trademark, saying



Trade Mark of the Crystal Division, Mallory Industries, Inc.

in this connection: "To enhance the social and political liberties of American women by the more precious freedom from long hours of drudgery a great organization has devoted its efforts and its resources to producing labor-saving devices for the home." The catalog in a terse way tells of the merits of the Crystal machines, each description being accompanied by a fitting illustration.

Western Electric Company, 195 Broadway, New York City, has practically completed the construction of its new Foxhurst radio station at Elberon, N. J. All miscellaneous contracts in connection with the work have been awarded, and active operation will be inaugurated at an early date.

American Steam Conveyor Co., 326 West Madison street, Chicago, Ill., has issued an illustrated booklet describing the American trolley carrier, a new equipment manufactured by the company for handling coal or other bulk material. The equipment consists of an overhead trolley operated on either a monorail track or a suspension cable. A hoist is used to lower and move a 1-ton self-dumping bucket, in which the material is carried.

Union Electric Manufacturing Co., Milwaukee, Wis., manufacturer of electrical controlling devices, is sending out a handy indexed, leather bound book containing a number of bulletins on new devices and prices. Among the devices of special interest in the book are non-reversing drum starters, the "Star-Delta" starter and weather-proof drum controllers for industrial trucks, tractors, engines and mine locomotives. The book is replete with illustrations.

Belden Manufacturing Co., Western avenue and 23rd street, Chicago, Ill., manufacturer of electrical wire, cordage and cables, has issued catalog No. 8 giving prices on material manufactured by the company, together with the discount sheet applying to the new prices. In the catalog a number of new lines are listed and information and data are given as follows: Rubber-covered wire charts, technical data tables and a comprehensive telegraph code. The catalog contains 288 pages and is well illustrated.

Combustion Engineering Corp., 11 Broadway, New York City, manufacturer of type E stokers, Coxe stokers, Grieve grates and other boiler room equipment relating to combustion engineering, announces the resignation of its vice-president in charge of sales, E. P. Moritz. Mr. Moritz had been ill for some time previous to his resignation and owing to his continued ill-health it became necessary for him to retire from active business for some time. No successor to Mr. Moritz has yet been named by the company.

Beardslee Chandelier Manufacturing Co., 216 South Jefferson street, Chicago, Ill., in the March issue of the company's application, *"Beardslee Talks,"* announces a contest for dealers, jobbers and their employes who have actually sold Denzar light installations; prizes to be awarded to the 13 persons who write the best letters on "How I Sold Denzars." The first prize will be $25, second $15, third $10, while there will be 10 prizes of $5 each. The issue also contains an article by Fred R. Farmer, president of the company, and also president of the National Council of Lighting Fixture Manufacturers, on "What the National Council of Lighting Fixture Manufacturers Means to the Dealer."

T. H. Ball, technical advertising, Cleveland, O., has moved his office, 236 Engineers' building, to larger quarters at 204 Marion building. E. R. Barkley has joined Mr. Hall in the agency work as chief of staff after eight years' experience in advertising work in mail order, agency and trade paper fields.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has appointed L. A. S. Wood manager of the illuminating section of its supply

L. A. S. Wood.

department, with headquarters at South Bend, Ind. Mr. Wood has been closely connected with the lighting industry ever since he began his business career. He was born in London, Eng., and received his education at the City of London School and the University of London, afterwards studying electrical engineering under Prof. Sylvanus P. Thompson at Finsbury Technical College. After being connected for many years with the Edison and Swan United Electric Light Co., in England, Mr. Wood came to this country in 1911 to introduce the flame carbon arc lamp and was shortly afterwards appointed arc lamp expert of the Westinghouse company. Soon after the introduction of the Mazda C lamp he became associated with the George Cutter Co., South Bend, as illuminating engineer and during the past nine years has traveled extensively, taking an active interest in street-lighting improvements in all parts of the country.

Erie Electrical Equipment Co., Inc., Johnstown, Pa., has been organized for the purpose of manufacturing and selling electrical appliances, principally electrical equipment for central and substation power houses under various patents granted to H. A. Selah, which have been taken over by the company. These patents cover threadless pipe fittings used in pipe-frame structural work, together with fittings for mounting high and low tension insulators to pipe-frame structures. John A. Hershberger is president; S. A. George, vice president, and H. A. Selah, secretary and treasurer of the company.

PERSONAL MENTION

Biographical Sketches and Chronicle of Changes in Business Connections, Promotions and Other Personal News of the Industry

C. A. BREECE, Bluffton, Ind., has been appointed general manager of the Indiana Bell Telephone Co., with offices at Indianapolis.

DAVID S. WEGG, JR., has been appointed sales engineer in the Chicago office of the Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

ROBERT K. MORTON will resign as general manager of George W. Prentiss & Co., Holyoke, Mass., on May 1, to become treasurer of the Holyoke Covered Wire Co.

FRANK A. COOMBE, chief engineer of Babcock & Wilcox, Ltd., Montreal, Que., has resigned to enter private practice, specializing in boiler-plant design and operation.

LOUIS B. STILLWELL, Lakewood, N. J., formerly president of the American Society of Electrical Engineers, has been elected a life member of the Board of Trustees of Princeton University.

W. F. BAUER has resigned as western manager of the railroad department of the Edison Storage Battery Co., Chicago, Ill., to become connected with the railroad department of Hodgart & Co., Peoples Gas Building, Chicago.

CLARENCE M. FINCH, formerly employed by the Aetna Life Insurance Co., Hartford, Conn., is now associated with the building department of the Lynn (Mass.) works of the General Electric Co., as a mechanical engineer.

WALTER REITZ has been made general superintendent of the Hot Springs (Ark.) Utilities Co. He was formerly connected with the electrical and mechanical department of the Douglas Co., Cedar Rapids, Ia.

SAMUEL FERGUSON has been elected president of the Connecticut Power Co., recently acquired by the Hartford (Conn.) Electric Light Co., of which Mr. Ferguson is vice-president.

J. A. H. O'REILLY, formerly statistical engineer of the Winnipeg Electric Railway Co., Winnipeg, Man., has been appointed secretary of the research committee of the Winnipeg Board of Trade.

ROBERT MONTGOMERY, manager of the commercial department of the Louisville Gas & Electric Co., addressed the Louisville Rotary Club at a recent meeting on "Meters and Complaints," the address being illustrated with lantern slides.

A. E. WISHON, Fresno, Cal., general manager of the San Joaquin Light & Power Co., and president of the Pacific Coast Section of the National Electric Light Association, addressed electrical interests in Pittsburgh, Pa., at the William Penn Hotel, on April 16, on the subject of "What the Development of the Electric Industry Means to the Man on the Street."

HERBERT C. STEPHENS is now sales engineer for the Electric Motor & Repair Co., Akron, O. He was formerly power engineer of the Northern Ohio Traction and Light Co., Akron.

JAMES POTTS is now manager of the Rollins (Wyo.) Electric Light & Power Co., going to that company from the Hot Springs (Ark.) Utilities Co., where he was general superintendent.

HAROLD B. HARVEY, president of the Marquette Electric Engineering Co., Chicago, Ill., was elected president of the Rotary Club of Chicago at its annual election held April 16. Mr. Harvey is also a member of the Chicago Electric Club, American Association of Engineers and Technology Club.

Harold B. Harvey.

THOMAS A. BROWNE, until recently identified with the Jones Speedometer Co., New Rochelle, N. Y., has entered the employ of the Weston Electrical Instrument Co., Newark, N. J.

WILLIAM TIETZE has resigned from his position as chief engineer of the Cudahy Bros. Co., Cudahy, Wis., to become general manager of the Citizens Light, Heat & Power Co., Canby, Minn.

HARRY H. BATES has resigned as field engineer in the stoker department of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., to accept the position of superintendent of equipment of the Acme White Lead & Color Works, Detroit, Mich.

VERNON M. F. TALLMAN has been appointed power engineer of Charles H. Tenney & Co., with headquarters at Boston, Mass. He is a graduate of the electrical engineering course of the Massachusetts Institute of Technology of the class of 1914 .

G. F. KIRKPATRICK, manager of the appliance department of the Pacific Northwest for the Pacific States Electric Co., Seattle, Wash., has resigned the position and taken up similar duties with the Electric Appliance Co., Seattle.

FRANK S. SCHUYLER, formerly attached to the sales force of the Allis-Chalmers Manufacturing Co. in the Pittsburgh, Pa., office has been promoted to the position of district sales manager with headquarters at Detroit.

ELIHU THOMSON, chief consulting engineer of the Lynn (Mass.) plant of the General Electric Co., has been appointed acting president of the Massachusetts Institute of Technology. He will hold office until a permanent successor to the late R. C. Maclaurin is chosen.

DR. C. H. SHARP, chairman of the Automobile Lighting Specification Committee of the Illuminating Engineering Society, has been designated as official representative of the society to attend the annual convention of the National Traffic Officers Association, to be held in San Francisco Aug. 23-27, inclusive. Dr. Sharp will discuss glare and other phases of auto headlights.

W. E. THAU, general engineer, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has been appointed engineer in charge of marine section of the engineering department. Mr. Thau was graduated from the University of Cincinnati in 1911 and was entered in the apprenticeship course of the Westinghouse company. He has been in marine engineering work since the Westinghouse company became actively associated with the development of electrical equipment for this type of service.

OBITUARY.

Z. J. CHAMBERLAIN, who was connected with the Ludlow-Saylor Wire Co., St. Louis, Mo., since he was 17 years old, died recently in that city at the age of 45 years.

DAVID N. BALDERSON, who had been connected with the Electro Dynamic Co., Bayonne, N. J., as engineer and superintendent for 22 years, died recently at Philadelphia, Pa. His home was in Elizabeth, N. J.

IGNATIUS P. GOUGH, 1730 St. Paul street, Baltimore, Md., formerly superintendent of the Preston street line of the United Railways Co., died on April 13, from injuries received in an automobile accident. Mr. Gough was 72 years of age.

THOMAS B. KERR, for a number of years personal counsel of the late George Westinghouse in patent matters, died April 1, at his home in Englewood, N. J., following a long illness. Mr. Kerr was 71 years old and a graduate of the University of Pittsburgh.

BUSINESS OPPORTUNITIES

News of Electrical Construction Projects in All Parts of the Country, Proposals Invited, Foreign Trade Openings and New Companies

EASTERN STATES

Clark Mills, Me.—The Clark Power House Co. is having plans prepared for the construction of a 1-story power house. Sawyer & Bean, 11 Lisbon street, Lewiston, Me., are the engineers on the project.

Rutland, Vt.—The Rutland Railway, Light & Power Co. has recently been awarded a contract for furnishing additional electrical power for the operation of the C. E. Davis Foundry Co., following plans which have been prepared for improvements and extensions at this plant.

South Poultney, Vt.—The Roberts & Carter Slate Quarry Co. has completed the installation of electrical equipment at its plant to replace the steam-operated apparatus formerly in service. The company is understood to be having plans prepared for the installation of electrically-driven air compressor apparatus at the works during the coming summer.

Cambridge, Mass.—Considerable refrigerating apparatus, electrical equipment, etc., will be required in connection with the construction of the proposed new refrigerating plant of the E. E. Gray Co., to be located on Albany street. The structure, including equipment, is estimated to cost about $250,000. The F. F. Jonsberg Co., 16 Central street, Boston, are architects and engineers.

New Haven, Conn.—The United Illuminating Co., Grand avenue, has inaugurated work on the construction of a new addition to its power plant and alterations and improvements in the existing structure. It is proposed to enlarge the power, blower and turbine rooms, and provide for the installation of a quantity of new equipment.

Batavia, N. Y.—The Genesee Light & Power Co. has filed application with the Public Service Commission for permission to extend its power lines to the town of Darien, Genesee county, for furnishing electrical energy for light, heat and power purposes.

Binghamton, N. Y.—The Binghamton Light, Heat & Power Co. is making rapid progress on the extension of its transmission lines to furnish electrical energy for the Broome County Tuberculosis Hospital, a distance of about 3 mi. from the present pole line terminal.

Endicott, N. Y.—The Endicott waterworks has completed arrangements for the installation of three new 1200-hp. motor-driven pumping units at its plant, for increased operations. Electrical energy will be furnished by the Binghamton Light, Heat & Power Co.

Gowanda, N. Y.—The Iroquois Utilities Corp., 39 West Main street, is understood to be arranging for the construction of a new concrete and steel power plant on Cattaragus creek. The structure is estimated to cost about $150,000.

Long Island City, N. Y.—The National Sugar Refining Co. has had plans prepared for the construction of a new 1-story brick power plant, about 52 by 61 ft., on Dock street, near Front street. The structure is estimated to cost about $28,000.

Long Lake, N. Y.—Long Lake Telephone Co. has filed notice with the Secretary of State of the dissolution of the company.

Medina, N. Y.—The Western New York Utilities Co., Inc., 532 Main street, has filed application with the Public Service Commission, Albany, for permission to make extensions and improvements in its electric light and power plants at Kendall, Barre and Hamlin, for increased operations. The company is planning to issue bonds for $260,000 for the work.

New York, N. Y.—The Teachers' College, Columbia University, is having plans prepared for the construction of a large new power plant at the institution, to be located on 120th street, between Broadway and Amsterdam avenue. The structure is estimated to cost, it is understood, in excess of $100,000.

New York, N. Y.—New York Telephone Co., 15 Dey street, has had plans prepared for the construction of a 5-story addition, about 35 by 43 ft., to its telephone exchange plant at Fairview and Gates avenues, Brooklyn, estimated to cost about $50,000.

New York, N. Y.—The United Electric Light & Power Co., 160 East 15th street, has had plans prepared for the construction of a new 1-story brick transformer station, about 30 by 95 ft., at 204 Elizabeth street, for increased operations. The structure, including equipment installation, is estimated to cost about $100,000. William Whitehill, 12 Elm street, is the architect.

New York, N. Y.—New York Telephone Co., 15 Dey street, has completed negotiations for the leasing of an entire floor of the Grand Central Palace, to facilitate operations. The property comprises about 35,000 sq. ft. of floor space.

Rochester, N. Y.—The Rochester Gas & Electric Corp. has been granted permission by the Public Service Commission, Albany, to issue bonds for $500,000, the proceeds to be used to defray, in part, the cost of the proposed extensions and improvements in the company's plants and system.

Dover, N. J.—The New Jersey Power & Light Co. is making rapid progress on the construction of a new 2300-volt power line to the plant of the Richardson-Boynton Stove Works, for increased power supply for the operation of this plant. The company is also arranging for the furnishing of additional electrical energy to the town of Dover.

Hackettstown, N. J.—The town council has completed arrangements for the rebuilding of the municipal fire alarm system.

Jamesburg, N. J.—The Board of Hospital Commissioners is having preliminary plans prepared for the construction of a new 1-story boiler plant, about 44 by 50 ft., at the local hospital. The work will include the erection of new coal bunkers.

Jersey City, N. J.—Plans are under consideration by the city commission and the New Jersey Trackless Trolley Co., Plainfield, J. G. Rossman, president, for the installation of a new "trackless trolley" system on Hudson boulevard, electrical energy for operation to be furnished by the power plant at Laurel Hill.

Newark, N. J.—The Accounting Machine Co., 238 Badger avenue, has had plans prepared for the construction of a new plant, 2-story, including boiler plant for general power service. The new works are estimated to cost $75,000, and it is understood that considerable electrical equipment will be required.

Newark, N. J.—National Carbonic Gas Co., McClellan street, has had plans prepared for the construction of a new 1-story combination building to be used as a boiler plant and machine shop at Frelinghuysen avenue and McClellan street. The boiler plant will be 46 by 46 ft., and the machine shop 46 by 56 ft., the structure being estimated to cost $40,000.

Perth Amboy, N. J.—Bids have been taken by the Board of Water Commissioners for the construction of the proposed new reservoir for the city waterworks, including pumping station, etc., this reservoir to have a capacity of 40,000,000 gals. The lowest bid on the project was $1,095,560, and large quantities of electrical equipment, including pumping apparatus, will be required.

Trenton, N. J.—The State House Commission, comprising the Governor, State Comptroller and the State Treasurer, has been authorized to employ experts to make a physical valuation of public utility property, including that of the underlying companies of the Public Service Corp.

Allentown, Pa.—The Lehigh Valley Light & Power Co. has recently inaugurated operations in a new 10,000-kw. turbine unit at its plant.

Catasauqua, Pa.—Phoenix Utilities

Co. has completed work on the construction of a new high-tension power line between the company's substation north of Siegfried and the power plant at Allentown.

Philadelphia, Pa.—The Philadelphia Electric Co., 19th and Allegheny streets, has taken out a building permit for the construction of a new addition to the transformer station at Marshall and Noble streets. The proposed structure is estimated to cost about $75,000.

Philadelphia, Pa.—Fire, on April 15, which caused damage estimtaed at about $150,000, destroyed the large warehouse building of the Keystone Telephone Co. at Columbia avenue and 12th street.

Philadelphia, Pa.—Light and power service throughout practically every section of the city, furnished by the Philadelphia Electric Co., was temporarily suspended on April 9, due to a fire affecting the high-voltage bus bars at the main generating plant of the company, 28th and Christian streets.

Philadelphia, Pa.—The Bell Telephone Co. has awarded a contract to F. L. Hoover & Sons, 1023 Cherry street, for the proposed alterations and improvements in its administration building at 57th and Chestnut streets, estimated to cost $25,000.

Pottstown, Pa.—Considerable laundry machinery, etc., will be required by the Pottstown Hospital in connection with the construction of the new 1-story laundry building at the institution estimated to cost about $15,000, to be located on North Charlotte street. Contract for construction has been awarded to Frederick H. Keiser, 128 East Fourth street, Pottstown.

Claymont, Del.—Town officials are understood to be considering plans for the installation of a new street-lighting system on the Philadelphia turnpike. The Claymont Community League is interested in the project.

Laurel, Md.—Plans are being prepared for the construction of a new addition to the municipal electric lighting plant. The state legislature has approved the issuance of bonds to cover the cost of the proposed work.

Washington, D. C.—The Potomac Electric Power Co. has had plans prepared for remodeling and improvements in its substation at 438 Washington street, to facilitate operations. The work is estimated to cost $17,000.

Baltimore, Md.—The Globe Shipbuilding & Dry Dock Co. has had plans prepared for the construction of a new 1-story power plant, about 35 by 110 ft., to be located on the south side of the Patapsco river, between Brooklyn and Fairfield avenues. The structure will cost about $7,500.

Frederick, Md.—The board of aldermen is considering plans for the construction and operation of a new municipal electric lighting plant for local service.

Huntington, W. Va.—The Consolidated Light, Heat & Power Co. has had plans prepared for extensive improvements in its plant, for increased operations. The work is estimated to cost close to $100,000. W. R. Power is the general manager of the company.

Huntington, W. Va.—The Virginia Power Co., Charleston, is having plans prepared for extensive improvements and additions for increased power operations. It is proposed to make extensions in the high-tension transmission lines from Cabin Creek to Huntington, as well as the installation of a quantity of new equipment at its Cabin Creek works, the project being estimated to cost in excess of $300,000. The company plans to furnish additional electric energy to the Consolidated Light, Heat & Power Co. of Huntington.

Roanoke Rapids, N. C.—Rosemary Manufacturing Co. has completed arrangements for the installation of a new turbine unit at its plant in connection with extensions for increased operations. J. E. Sirrine, Greenville, S. C., is the architect and engineer on the project.

Mt. Carmel, S. C.—Little River Light & Power Co., recently incorporated with a capital of $20,000, has perfected organization and is arranging plans for the construction of a new local power plant with transmission system. L. L. Hester is president and treasurer of the company.

Reynolds, Ga.—The city contemplates the erection of an electric lighting plant at an estimated cost of $35,000.

Winter Garden, Fla.—The city plans to erect an electric light plant.

NORTH CENTRAL STATES

Canton, O.—The city has authorized the issuance of $10,000 in lighting and waterworks bonds.

Bargerville, Ind.—N. E. White, Moran, Ind., will install an electric lighting plant in the town of Bargerville.

Columbia City, Ind.—Plans are being made whereby the municipal electric lighting plant of Columbia City will furnish light and power for the town of Larwell, 8 mi. distant.

Kokomo, Ind.—The International Engineering & Manufacturing Co. will build a plant costing $100,000 for manufacturing power-plant equipment.

Mt. Vernon, Ind.—The city council has laid before the Indiana Public Service Commission a proposal to purchase the plant of the Mount Vernon Electric Light and Power Co.

Bad Axe, Mich.—N. J. Frost and others plan to construct a 1-story electric power plant.

Taylorville, Ill.—The city is considering a bond issue to construct a municipal electric light plant.

Benton Harbor, Mich.—The Saranac Automatic Machine Co. will install considerable electrical equipment in a new paper box plant soon to be opened.

Corunna, Mich.—The Corunna Improvement Association and the Woman's Civic Club of that city are back of a movement for a boulevard system of lighting for the city.

Detroit, Mich.—The Blodgett Engineering and Tool Co. is having plans prepared for the construction of a 4-story factory for the manufacture of special machinery and jigs. Alvin E. Harley, 415 Woodward avenue, is the architect in charge.

Saginaw, Mich.—The new crankshaft plant of the General Motors Corp. will be ready for operation May 1. The plant covers 165 by 690 ft.

Traverse City, Mich.—The city plans to issue bonds for $75,000 for the purpose of erecting a steam auxiliary plant to the present water-power operated electric light plant.

La Crosse, Wis.—The National Gauge & Equipment Co. is erecting a 1-story machine shop addition, 135 by 253 ft., in which considerable electrically operated machinery will be installed.

Madison, Wis.—A company is being formed by Frank Siggelkow and others, of Madison, for the purpose of furnishing electrical energy to farmers for lighting purposes.

Manitowoc, Wis.—The Aluminum Goods Manufacturing Co. will build a 2-story rolling mill building, 60 by 350 ft., at an estimated cost of $500,000.

Marshfield, Wis.—The Roddis Lumber & Veneer Co. is having plans prepared for the construction of a 1-story power house addition. Boilers and a new generator unit will be installed in the addition. Cahill & Douglas, 217 West Water street, Milwaukee, Wis., are the engineers on the project.

Milwaukee, Wis.—The A. J. Lindeman & Holverson Co., A. J. Lindeman, president, has increased its capital stock from $200,000 to $400,000, and will enlarge its plant.

Red Oak, Ia.—The city is considering the construction of a municipal electric light plant at an estimated cost of $148,000.

Newton, Ia.—A. H. Rich, Des Moines, Ia., has purchased the Newton electric light plant.

South St. Louis, Mo.—The Southwestern Bell Telephone Co. has been authorized by the State Public Service Commission to consolidate its interests in Missouri, Kansas, Arkansas, Oklahoma, and Texas, as well as to issue common stock for $50,000,000 and preferred stock for $25,000,000 to finance the merger. The company has completed arrangements for this latter issue. E. D. Nims is president of the company.

SOUTH CENTRAL STATES

Whitesburg, Ky.—The Whitesburg Light & Power Co. contemplates improving its plant.

Knoxville, Tenn.—Electrification of the filtration plant of the city waterworks as an economic proposition has been proposed.

Castleberry, Ala.—The Castleberry Utilities Co. will build an electric light plant.

Pickens, Miss.—The town council is planning for a bond issue of $10,000, the proceeds to be used for extensions in the municipal electric light plant.

Columbia, La.—The city plans to install an electric light and water plant.

Monroe, La.—The city will rebuild the electric light plant, which was recently damaged by fire.

Brinkley, Ark.—In connection with proposed increased operations, the Arkansas Utilities Commission is arranging for the construction of a new transmission line to extend to the Clarendon and Cotton Plant districts. The work is estimated to cost approximately $250,000.

Little Rock, Ark.—The Arkansas Light & Power Co. is understood to be considering plans for the construction of a new transmission system to Russellville for service in this district.

Pine Bluff, Ark.—The Arkansas Light & Power Co. is planning improvements to cost $350,000.

Enid, Okla.—The city will build a power house and electric-lighting system at an estimated cost of $500,000.

Clarendon, Tex.—The Clarendon Light & Power Co. will erect an electric light and power plant.

Houston, Tex.—The Mack Manufacturing Co., of Houston, has awarded the contract for the erection of a steel and concrete foundry building. The building will be equipped with a 3-ton electric furnace and other machinery.

Pharr, Tex.—The Pharr Ice and Power Co. has purchased the electric light and power plant of the Pharr Mill and Elevator Co., and will install additional equipment. The company furnishes light and power to San Juan and Swallow and will extend the transmission lines to other towns.

Tahoka, Tex.—An issue of $15,000 in bonds has been authorized by the city council, the proceeds to be used in installing equipment for the municipal electric light plant here.

WESTERN STATES

Salt Lake City, Utah.—The Western Union Telegraph Co. will expend over $100,000 in improvements in connection with the removal of the company's office to new quarters on Main street.

Laramie, Wyo.—The city has voted $60,000 in bonds for the establishment of an electric light plant.

Centralia, Wash.—The North Coast Power Co. will expend $20,000 in rebuilding transmission lines extending from Klama to Woodland in Cowlitz county and on a line extending to Ranier.

Everett, Wash.—The tentative plan for the new lighting system for the city includes about 14½ miles of line with poles 200 ft. apart on each side of the street but placed alternately so that there will be a light on the street every 100 ft.

Seattle, Wash.—Westinghouse Electric & Manufacturing Co. has sold to the Pacific Northwest Traction Co. a 500-kw. rotary automatic sub-station complete with all automatic devices, costing approximately $50,000, same to be installed on the Seattle-Everett interurban line.

Spokane, Wash. — Washington Water Power Co. is soon to construct a line from its Long Lake plant to Chewelah and supply the Stevens County Light & Power Co. with all the additional power required, providing a part of the necessary financial expenditure, which would amount to over $100,000, is advanced by the parties interested. The magnesite industries have guaranteed $70,000.

Vancouver, Wash.—Forty permanent arches are to be constructed in the business district to be studded with electric lights for lighting the streets

CANADA

East Brockville, Ont.—Machinery & Foundries, Ltd., Brockville, Ont., is having plans prepared for the erection of a foundry to cost $60,000. B. Dillon, 43 King street, East Brockville, Ont., is the architect.

Montreal, Que.—MacGovern & Co., Ltd., will soon start work on a plant for the manufacture of electrical equipment, iron and steel products, etc. The company has capital stock of $350,000 and was formed by Maurice Dugas, Benjamine Robinson, Clarence F. McCaffrey and others.

Toronto, Ont.—The Lion Tire & Rubber Co., Kent building, has purchased a site at New Toronto and will start work immediately on the erection of a reinforced concrete factory to cost $500,000.

Moosomin, Sask. — Bids will be asked by the town council in the near future for the installation of an electric light plant at an estimated cost of $50,000.

Bashaw, Alta.—Verle A. McCarty, Stettler, Alta., will erect a plant and install machinery to furnish electrical energy to citizens of Bashaw.

Toronto, Ont.—Canadian General Electric Co. has had plans prepared for a new plant to be located on King street.

Winnipeg, Man. — The city will build an extension to the electric light power plant, at an estimated cost of $198,333. Thomas Kelly & Sons, 511 Lindsay building, Winnipeg, are the general contractors on the work.

INCORPORATIONS

Greenwood, S. D.—The East Greenwood Telephone and Electric Co. has been incorporated with capital stock of $5000. E. H. Williams, J. G. Parkerson, J. A. Gresham and A. P. Snyder are the incorporators.

New York, N. Y.—John Reid & Co, Capital stock, $500,000. To manufacture marine engines, boilers, etc. Incorporators: A. J. Michel, J. Reid and C. H. Lane, 607 Halsey street, Brooklyn.

New York, N. Y.—Wilson-Armstrong Manufacturing Co. Capital stock, $100,000. To manufacture motors, etc. Incorporators: A. Rothstein, A. Skillman and H. A. Kashden, 120 Broadway.

Butler, Ind.—The Indiana Power and Light Co. has been incorporated with capital stock of $100,000 to supply electrical energy for heat, light and power. The directors are L. Hooper, C. A. Olson, Don J. Blair, A. W. Wright and C. A. Engel.

Portland, Ind.—Portland Electric Co., capitalized at $35,000, has been incorporated to deal in electrical merchandise. The directors are O. F. Bickel, A. E. Chew and J. A. Morrison.

New York, N. Y.—Advance Boiler Corp. Capital stock, $500,000. To manufacture boilers, etc. Incorporators: G. W. and T. Moffitt, and J. J. Schmitt, 337 Second avenue.

New York, N. Y.—Mande Corp. Active capital stock, $32,500. To manufacture engines, boilers, etc. Incorporators: H. Brill, C. A. Brodek and F. L. Haver, 44 Cedar street.

Newark, N. J.—General Auto Electric Co., 257 Halsey street. Capital stock, $50,000. To manufacture magnetos and auto electrical goods. Incorporators: W. F. Henke, D. E. Lenthe and F. E. Draiss.

Camden, N. J.—Evans Storage Battery Co. Capital stock, $250,000. To manufacture electric storage batteries, etc. Incorporators: Frank S. Muzzey, Joseph P. Murray and F. S. Saurman.

Atlantic City, N. J. — Haughey's Burglar & Fire Alarm System. Capital stock, $100,000. To manufacture burglar and fire alarm systems. Incorporators: Charles C. McKeague, O. E. White and William M. Haughey.

Newark, N. J.—Federal Steel Products Co. Capital stock, $50,000. To manufacture switch boxes, etc. Incorporators: I. T. Friedman, Newark, and David Mark, New York.

Wilmington, Del.—Centrifugal Engine Co. Capital stock, $100,000. To manufacture centrifugal engines, etc. Incorporators: A. E. Wallace, Martin E. and Artemas Smith, Wilmington.

York, Ala.—York Light & Power Co. Capital stock, $10,000. To operate a local electric light and power plant. J. B. Ross is the principal incorporator.

Milwaukee, Wis.—The Stenz Electric Co. has been incorporated with capital stock of $40,000 to manufacture, repair and deal in power plant and electrical equipment. Albert A. Stenz is president of the company.

Dayton, O.—The Master Electric Co. has been incorporated with capital stock of $50,000 to manufacture small motors. E. P. Larsh, S. A. Brown, A. C. Jackson, R. G. Corwin and John H. Larsh are the incorporators.

PROPOSALS

Kinston, N. C.—Until May 11, bids will be received by the city, Joe Dawson, mayor, for the installation of a new municipal power plant. Complete machinery and equipment will be installed, including turbogenerator unit, surface condenser, with dry vacuum and hot-well pumps, and auxiliary apparatus. W. C. Olsen, Sumter, S. C., is the consulting engineer for the city.

Good Will as a Basis of Credit

Matters of advertising are not ordinarily discussed on this page, except insofar as they relate to the purely economic aspects of business. Significant of the latter, however, is a statement recently made by Charles H. Sabin, President of the Guaranty Trust Co., New York, who said:

> "I believe thoroughly in advertising as a selling agent, not only for commodities but for ideas and services, and throughout my business career as a banker I have made use of it with profit and satisfaction. I believe that advertising can be made just as useful to a bank as to any other institution that has something to offer to the public, and our own experience in that field has well justified this conclusion. Moreover, I believe that educational and informative advertising can be made of the greatest value to the public and can further the interests of sound economics and sound business. Good will values created through advertising constitute decided elements of credit in a corporation's assets, and such values will always be taken into consideration in any judgments we form."

The writer has found, in talking with bankers, that the judgment expressed by this great New York financier is getting to be practically unanimous. Furthermore. there is nothing so important and so lasting in its effects as the so-called "intangible" element of good will. It permeates and controls every factor of business. Many a man whose physical assets might be swept away today, but who has created and maintained good will values, could rise phoenix-like tomorrow from the ashes of his industry, establishing a new business on the ruins of the old. We are all familiar with numerous cases in which this has been done. But the man who suffers serious reverses and has no established good will values to fall back on is, indeed, to be pitied. He seldom, if ever, recovers his position. It is one of the most encouraging signs of the times that American business men, generally, recognize this basic truth and are acting in accordance with it.

C. A. TUPPER, President,
International Trade Press, Inc., Chicago.

FINANCIAL NEWS

Comment on the Financial Outlook in the Electrical Industry, New Securities, Reports of Earnings, Dividends and Utility Stocks

Republic Railway & Light Shows Healthy Increase.

The Republic Railway & Light Co. reports for February gross earnings of $659,848, an increase of $162,275, or 32.63%, from those of the same months a year ago, and a surplus after preferred dividends of $27,509, against $6802 in February, 1919. For the twelve months ended on Feb. 29, the company reports gross earnings of $6,588,329, an increase of $957,212, or 17%, and a surplus after preferred dividends, of $142,000, as contrasted with a deficit of $58,709 in the same period a year ago.

Philadelphia Electric Gains in Surplus.

The annual report of the Philadelphia Electric Co. for 1919 shows surplus after charges and Federal taxes of $3,206,026, equivalent to $2.22 a share of $25 par value earned on $29,618,325 of capital stock against $2,032,394 surplus, or $2.03 a share earned on $24,987,750 of capital stock in 1918.

Western Union Telegraph Co.

The earnings report of the Western Union Telegraph Co. for the three months ended March 31, 1920, with the month of March figures estimated, shows a net income for the period of $3,550,000. The figures for the same period in 1919 are not given as the company was at that time under government control. The 1920 figures follow:

Gross revenues, including dividends and interest	$28,650,000.00
Maintenance; repairs and reserved for depreciation	$ 3,975,000.00
Other operating expenses, including rent of leased lines and taxes	20,792,000.00
Total expenses	$24,767,000.00
Balance	$ 3,883,000.00
Deduct interest on bonded debt	333,000.00
Net income	$ 3,550,000.00

Carolina Power & Light Co.

Earnings of the Carolina Power & Light Co. for December and the twelve months ended Dec. 31, 1919, compare with 1918 as follows:

	1919.	1918.	Changes. Increase.
Dec. gross	$ 119,241	$ 99,171	$ 20,070
Net after taxes	34,435	34,122	313
Total income	70,782	69,820	962
Surplus after charges	54,801	51,690	3,111
Twelve months' gross	1,249,809	1,015,383	234,426
Net after taxes	398,443	349,159	49,284
Total income	558,099	502,181	55,918
Surplus after charges	368,203	320,293	47,910
Balance after preferred dividends	241,180	194,657	46,523

Tennessee Railway Light & Power Co.

Earnings of the Tennessee Railway, Light & Power Co., together with the Nashville Railway & Light Co. and the Chattanooga Railway & Light Co. for February and the twelve months ended Feb. 29, 1920, compare with 1919 as follows:

	1920.	1919.	Changes. Increase.
Feb. gross	$ 489,984	$ 472,337	$ 17,647
Net after taxes	204,992	214,569	*9,577
Twelve months' gross	5,542,080	5,475,975	66,105
Net after taxes	2,044,459	2,311,863	267,404

*Decrease.

Utah Power & Light Co.

Earnings of the Utah Power & Light Co., together with the Western Colorado Power Co., for January and the twelve months ended Jan. 31, 1920, compare with 1919 as follows:

	1920.	1919.	Changes. Increase.
Jan. gross	$ 576,949	$ 506,856	$ 70,093
Net after taxes	274,442	272,787	1,665
Total income	284,025	280,944	3,081
Surplus after charges	145,545	137,010	8,535
Twelve months' gross	5,726,052	5,588,872	137,180
Net after taxes	2,788,070	2,956,368	*168,298
Total income	2,902,108	3,089,970	*187,862
Surplus after charges	1,238,741	1,370,084	*131,343
Balance after preferred dividends	663,285	851,357	*188,072

*Decrease.

Fort Worth Power & Light Co.

Earnings of the Fort Worth Power & Light Co., a subsidiary of the Southwestern Power & Light Co., for December and the twelve months ended Dec. 31, 1919, compare with 1918 as follows:

	1919.	1918.	Changes. Inc.
Dec. gross	$ 172,847	$ 116,199	$56,648
Net after taxes	95,827	57,870	37,957
Total income	97,832	58,379	39,453
Surplus after int. charges.	84,547	45,683	38,864
Twelve months' gross	1,398,321	1,305,160	93,161
Net after taxes	643,189	591,078	52,111
Total income	648,954	593,885	55,069
Surplus after int. charges.	490,906	450,631	40,275
Balance after pfd. divs.	394,656	357,141	37,515

Pacific Power & Light Co.

The earnings of the Pacific Power Co., a subsidiary of the American Power & Light Co., for December and the 12 months ended Dec. 31, 1919, compare with 1918 as follows:

	1919.	1918.
December gross	$ 197,842	$ 170,378
Net after taxes	88,005	88,548
Total income	88,944	90,922
Sur. after int. charges	45,351	46,777
Twelve months' gross	2,175,922	1,358,936
Net after taxes	1,039,595	869,052
Total income	1,049,687	873,084
Sur. after int. charges	508,797	376,124
Bal. after pfd. div.	319,253	187,941

American Power & Light Co.

Earnings of subsidiary companies controlled by the American Power & Light Co. for January and the twelve months ended Jan. 31, 1920, compare with 1919 as follows:

	1920.	1919.	Changes. Increase.
Jan. gross	$1,781,224	$1,406,691	$374,533
Net earnings	753,679	540,405	213,274
Twelve months' gross	16,681,893	13,939,523	2,742,373
Net earnings	6,375,220	5,302,422	1,072,798

Portland Railway, Light & Power Co.

Earnings of the Portland Railway, Light & Power Co. for February and the twelve months ended Feb. 29, 1920, compared with 1919 as follows:

	1920.	1919.	Changes. Increase.
Feb. gross	$ 704,193	$ 686,911	$ 17,282
Net after taxes	237,770	288,262	*50,492
Twelve months' gross	8,673,544	7,890,219	783,325
Net after taxes	3,055,166	2,590,843	464,323

*Decrease.

WEEKLY COMPARISON OF CLOSING-BID PRICES OF SECURITIES OF LEADING ELECTRICAL COMPANIES.

Quotations furnished by F. M. Zeiler & Co., Rookery Bldg., Chicago.

Public Utilities—	Div. rate. Per cent.	Bid Apr. 13.	Bid Apr. 20.
Adirondack Electric Power of Glens Falls, common	6	10	11
Adirondack Electric Power of Glens Falls, preferred	6	75	73
American Gas & Electric of New York, common	10+extra	120	121
American Gas & Electric of New York, preferred	6	38	37½
American Light & Traction of New York, common	..	184	174
American Light & Traction of New York, preferred	6	88	88
American Power & Light of New York, common	4	61	60
American Power & Light of New York, preferred	6	69	70½
American Public Utilities of Grand Rapids, common	..	5	5
American Public Utilities of Grand Rapids, preferred	7	13	14
American Telephone & Telegraph of New York	..	103	104
American Water Works & Elec. of New York, common	..	2	2
American Water Works & Elec. of New York, particip	7	7	8
American Water Works & Elec. of New York, first preferred	..	45	45
Appalachian Power, common	..	1½	1
Appalachian Power, preferred	7	17	15
Cities Service of New York, common	+extra	385	382
Cities Service of New York, preferred	6	69	69
Commonwealth Edison of Chicago	8	105	105
Comm. Power, Railway & Light of Jackson, common	..	23	23
Comm. Power, Railway & Light of Jackson, preferred	6	49	47
Federal Light & Traction of New York, common	..	6	6
Federal Light & Traction of New York, preferred	..	45	44
Middle West Utilities of Chicago, common	..	19	19
Middle West Utilities of Chicago, preferred	..	39	40
Northern States Power of Chicago, common	..	47	47
Northern States Power of Chicago, preferred	ex.div.7	85	85
Pacific Gas & Electric of San Francisco, common	..	50	50
Public Service of Northern Illinois, Chicago, common	7	78	78
Public Service of Northern Illinois, Chicago, preferred	6	83	82
Republic Railway & Light of Youngstown, common	4	17	16
Republic Railway & Light of Youngstown, preferred	6	54	54
Standard Gas & Electric of Chicago, common	..	18	17
Standard Gas & Electric of Chicago, preferred	6	39	39
Tennessee Railway, Light & Power of Chattanooga, common	..	1	1
Tennessee Railway, Light & Power of Chattanooga, preferred	6	5	5
United Light & Railways of Grand Rapids, common	4	24	24
United Light & Railways of Grand Rapids, preferred	6	62	61
Western Power of San Francisco, common	..	17	16
Western Union Telegraph of New York	extra	82	82
Industrials—			
Electric Storage of Philadelphia, common	4	106	105
General Electric of Schenectady	8	175	175
Westinghouse Electric & Mfg. of Pittsburgh, common	7	53	54